Report on

SCHOOLS of PUBLIC HEALTH in the United States

BASED ON A SURVEY OF SCHOOLS OF PUBLIC HEALTH IN 1950

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Letter of Transmittal

WASHINGTON, D. C., *March 23, 1953.*

Dear Dr. Scheele:

At the request of the Association of Schools of Public Health, you authorized the Division of Public Health Methods to make a study which would provide information on the status of professional education in public health, information upon which sound judgments could be made on a wide range of complex problems. In addition to the serious problems of financing which are now common to all institutions of higher education, there are many questions of educational policy resulting from the rapid evolution in public health practice and from the recent unprecedented expansion of organized health services—local, State, national, and international.

We have now completed the study and we submit herewith our Report on Schools of Public Health in the United States.

Many persons participated in planning the study and in accumulating and analyzing data. Objectives and methods of study were developed in this Division with the assistance of an advisory group composed of representatives of schools of public health, the American Public Health Association, other interested agencies, and other Divisions of the Public Health Service. Dr. Lowell J. Reed, vice president of Johns Hopkins University, served as chairman of this group and also as consultant throughout the period of field work and of analysis of findings.

Principal responsibility for the study was assumed by Dr. Leonard S. Rosenfeld with the assistance of Mr. Oscar H. Levine and Dr. Marjorie Gooch. We are also indebted to Dr. Howard Kline, Dr. John Brotherston, and Dr. Antonio Ciocco, who developed methods for the first part of the study; to Dr. Charles L. Williams, Jr., Miss Olive Johnson, and again to

Dr. Brotherston, who visited schools of public health to accumulate information on organization, staffing, students, and programs; to Mrs. Margaret D. West who aided in the analysis of data; to Miss Beatrice Crowther who assisted in tabulation and verification of data; and to Miss Martha D. Ring who helped in the organization and integration of the report as a whole.

We are very grateful to the deans and faculty of schools of public health, as well as to finance officers, other university officials, and students for providing the great volume of information upon which this report is based.

Respectfully yours,

GEORGE ST. J. PERROTT, *Chief*,
Division of Public Health Methods.

DR. LEONARD A. SCHEELE, *Surgeon General*,
PUBLIC HEALTH SERVICE,
WASHINGTON, 25, D. C.

Preface

IN PLANNING this study, the staff and consultants decided that the first objective was the preparation of a comprehensive description of the schools of public health, their organization, programs, and needs. Such a report, it was felt, would provide a sound basis for later evaluation of progress in the education of public health personnel, and for consideration of many problems of educational policy which must be resolved if schools of public health are to fulfill their potentialities in meeting the Nation's needs.

Professional education in public health, a relative newcomer in the broad field of education in the health professions, has been characterized by independent thought, active experimentation, and a wide diversity of approach. This experimentation provides a rich fund of experience on which to draw in evaluating the effectiveness of education in public health and in projecting future trends of development. It must continue if education in this field is to retain its place as a vital part of the structure of health services.

This report should expedite the process of evolution of professional education in public health. As a descriptive statement, it makes available for the first time in comprehensive form information concerning important characteristics of schools of public health. The fact that the report does not limit itself to an analysis of the aggregate experience of the schools, but also presents data relating to individual schools, should greatly enhance its value to the schools themselves, to universities in general, to the public health profession, and to the public at large. The Association of Schools of Public Health and the schools and universities participating in the study should be commended for approving the publication of the detailed findings of the survey.

Although the present report has distinct value as a descriptive statement, its full usefulness cannot be realized unless it is followed by a careful scrutiny of the progress it records and by an equally careful consideration of the many unanswered and often perplexing questions it raises concerning the objectives, methods, and effectiveness of public health training. In the evolution of community health organization and practice, are there categories of personnel other than those being trained that would profit by training in a school of public health? What new areas of teaching and research should be developed, and what established areas might be reoriented, combined, or reduced in light of current and anticipated future needs? How can the various educational methods employed by schools of public health be evaluated? Are present standards of staffing, support, and facilities adequate in light of present practices and future needs? Are there ways in which the cost of public health training can be reduced without sacrificing the quality of training, or without jeopardizing the achievement of established objectives? What steps can schools of public health and universities take, in cooperation with governmental and voluntary agencies, in attracting to public health a sufficient number of physicians and other types of personnel to meet current and future needs? These are some of the broad questions which educators must consider in planning the future course of professional education in public health.

I feel that the staff of the Division of Public Health Methods should be commended on having accomplished a very difficult task in synthesizing a wide range of data.

LOWELL J. REED, *Consultant*,
Vice President,
Johns Hopkins University.

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Summary

Introduction

1. Schools of public health in the United States provide special training for several groups of persons for work in official and voluntary agencies concerned with community health services. Among these groups are physicians, engineers, nurses, dentists, veterinarians, statisticians, nutritionists, health educators, and laboratory scientists. New categories of specialized public health personnel have been added from time to time with expansion of the scientific knowledge upon which public health practice is based and with extension of the scope of community health services. The need for trained personnel has increased with the development of State and local public health programs, aided by Federal grants to States under the Social Security Act of 1935 (p. 7).

2. In 1941, an Association of Schools of Public Health was organized for the exchange of information of mutual interest concerning the graduate education of professional personnel for service in public health and to promote and improve the education and training of such personnel. In 1946, the American Public Health Association undertook the accreditation of schools of public health. This step, as well as the definition of educational qualifications for specialists in public health by the Committee on Professional Education of the American Public Health Association and the adoption of personnel merit systems by State health agencies, has helped improve the professional status of public health workers (p. 8).

3. The Division of Public Health Methods of the Public Health Service undertook a study of schools of public health in 1950 at the request of the Association of Schools of Public Health. This report provides a descriptive statement of the educational programs, resources, financing, and needs of the nine schools accredited for that year (p. 10).

The Schools and Their Programs

1. Schools of public health have in common three basic functions—to provide training in public health sciences and public health practice, to conduct research, and to participate in the development and improvement of community health services (p. 12).

2. Patterns of organization of schools of public health and their relationships with medical schools and other parts of the university derive from the way the schools came into being, their initial and

continuing sources of support, and university policies. In genera
schools fall into three organizational groups: those which are rela
tively independent units within the university; those which are unit
within organized divisions of medical sciences; and those which ar
organized as departments of medical schools. The extent to whic
the schools of public health exchange educational services with othe
units of the university is determined in part by differences in re
lationships within the university (p. 12).

3. In addition to graduate education which all schools provide, for
of the schools of public health offer undergraduate instruction leadir
to a bachelor of science degree in one of the several fields of publ
health (p. 14).

4. The organization of the courses of instruction in the sever
schools shows wide variation. In the aggregate, instruction may b
classified into some 14 subject areas plus a miscellaneous group
subjects dealing with control of specific diseases. These subjec
cover both the basic public health sciences and applied fields (p. 15

5. Measured by both staff time and expenditures, research const
tuted an important activity of schools of public health durin
the study year. Principal areas of research were: infectious disease
basic public health sciences (such as physiology, biochemistry, an
statistics), and environmental sanitation (p. 17).

6. Community service programs of schools of public health inclu
such activities as continuation or extension courses for people outsi
the university, faculty participation in committee and consultati
work, and the provision of direct services to the community (p. 18

7. Instruction at the schools of public health has a twofold purpos
the development of a broad understanding of fundamentals of pub
health for all students, and the training of specialists in various typ
of community health service. The schools show wide differences
their approach to these goals. Both content and methods of instru
tion are gradually changing. The changes in content and focus
teaching reflect increased interest in adult health, mental health, a
importance of socioeconomic factors in health. Relatively less e
phasis is now being placed on communicable disease control. C
rent trends in methods of instruction are toward the teaching of sm
groups of students, affording an opportunity to develop the hea
team concept so that the different professional groups may learn
work together. Schools are experimenting actively with methods
integrating instruction to show students the close interrelationsh
among fields of study (p. 21).

8. The largest number of credit hours of instruction for gradu
students was given in the field of public health administration. N
in order were biostatistics, environmental sanitation, microbiolo
hospital administration, public health education, epidemiology,

tropical public health. Together, these 8 fields constituted 76 percent of the total credit hours of instruction for graduate students (p. 22).

9. Courses given by schools of public health can be grouped into two major categories: the basic public health sciences, and subjects representing the application of public health principles and techniques. The first category includes biostatistics, epidemiology, microbiology, nutrition or biochemistry, physiological hygiene, and tropical public health. The second group includes public health administration, public health education, environmental sanitation, hospital administration, industrial hygiene, maternal and child health, medical economics, and public health nursing, as well as subjects focused on control of cancer, mental disease, venereal disease, or other disease groups (p. 24).

10. Fieldwork of various sorts is being used more extensively than formerly to complement classroom and laboratory exercises. It includes training and supervised work in hospital outpatient departments, observation of the operation of health departments and special programs, participation in field surveys, supervised field training in which the student under supervision assumes responsibility for certain aspects of the program, and residency training (p. 36).

School Facilities, Staff, and Students

1. Most of the schools of public health were overcrowded in the study year. Library facilities were considered adequate. Not all schools had completely satisfactory clinical facilities available to their students. Need for better clinical facilities was cited by one or more deans in connection with maternal and child health, venereal disease, and mental hygiene. The deans reported a tendency for the schools of public health to move into closer relationships with the medical schools, partly to obtain better clinical facilities (p. 39).

2. Facilities for field training vary—some schools using the same facilities each year and others using different facilities in accordance with need. County and city health departments are used to some extent by all schools. In some instances, the health department personnel receive faculty appointments at the schools (p. 40).

3. The 9 schools of public health together reported 484 faculty members and 102 technical staff members. Of these 484 faculty members, 48 percent were full-time employees of the school of public health (Status A); 22 percent were full-time employees of the university, devoting part time to the school of public health (Status B); and 30 percent were part-time employees of the school of public health (Status C). This count does not include visiting lecturers who gave isolated lectures but who did not have any responsibility for organizing courses (p. 41).

4. Professors and associate professors constituted 33 percent of the faculty; lecturers, 20 percent; assistant professors, associates, research associates, and instructors, 37 percent; and assistants, research assistants, and research fellows, 10 percent (p. 42).

5. The largest number of staff, totaling 86 professional and 2 technical personnel was reported for departments of public health administration. Epidemiology departments had the next largest number of staff—52 professional and 14 technical personnel. Some departments, such as biostatistics and medical economics, had a high proportion of full-time staff while others, such as public health administration and hospital administration, used a high proportion of part-time personnel. More than 40 percent of the faculty during the study year were physicians (p. 43).

6. The full-time faculty spent 97 percent of their time on duties directly connected with the functions of the schools of public health and the remaining 3 percent on other university duties, such as teaching medical school students. The Status B faculty gave 42 percent of their time to the school of public health and 58 percent to other university duties. The "C" group spent 16 percent of their time in the schools of public health, 4 percent in other university duties, and 80 percent in work outside the university (p. 48).

7. In terms of full-time equivalents, 42 percent of the faculty time was spent in teaching, 8 percent in community service, 40 percent in research, and 10 percent in administration (p. 48).

8. The schools gave instruction to three groups of students—graduate, undergraduate, and special students. All schools had graduate students, 4 of the 9 schools had undergraduate students, and 8 had special students (p. 50).

9. Of the 1,239 students estimated to be enrolled in the schools of public health, 1,097 completed detailed schedules giving information on age, sex, residence, previous training and experience, major field of study in the school, and financial assistance received while at the school. Of these 1,097 students, 57 percent were graduate students, 31 percent were undergraduate students, and 12 percent were special students. Graduate students averaged 34 years of age; undergraduates, 28 years; and special students, 35 years. Students came to the schools of public health from 51 States, Territories, and possessions of the United States and from 39 foreign countries. The foreign students constituted 17 percent of the graduate student body. More than half of the graduate and special students had professional degrees—the largest number being physicians (p. 51).

10. At 3 of the 4 schools with undergraduate students, all such students were majoring in public health nursing. The fourth school offered undergraduate majors in public health laboratory, sanitation, preadministration, public health education, biostatistics, and a com-

bined group of subjects called premedical and public health curriculum (p. 56).

11. More than half of the graduate students were working for the master of public health degree, but seven other masters' degrees were offered at one or more schools. Approximately 10 percent of the graduate students were candidates for doctors' degrees (p. 58).

12. More than 80 percent of the graduate students reported that they were receiving some assistance to help finance their public health training. This fact points up the schools' dependence on the various supporting agencies for maintaining enrollment. In general, physicians received the largest amount of financial assistance (p. 59).

13. Eight of the nine schools were able to furnish data on the geographic location and positions held by their alumni. Alumni of these schools were located in every State of the United States and in many foreign countries. More than half of the alumni for whom information was available were employed by governmental agencies. Some 13 percent were engaged in teaching or conducting research in universities or colleges (p. 61).

Financial Status of the Schools

1. Professional education in public health is relatively expensive. The 9 schools spent nearly $3 million for basic operations in 1949–50. The distribution of expenditures among major elements of cost—namely, instruction, administration, plant operation and maintenance, and libraries—is similar to that found in medical and dental schools. The amount spent by individual schools varied widely and reflected the differences in program organization and relationships with other units of the university (p. 64).

2. The schools spent approximately $1.5 million for separately budgeted (project) research, a ratio of $50 of research expenditure for every $100 of expense for basic operations. This ratio was higher among private schools ($62 to $100) than among public schools ($37 to $100). Expenditures at individual schools ranged from $30,000 to $453,000 for project research. A direct relationship appeared between the size of the full-time faculty and the size of project research expenditures (p. 67).

3. Significant difference was found in the patterns of financial support of public and of private schools. Public schools depended largely on State appropriations and university transfers, whereas private schools leaned heavily on endowments, gifts, and grants. For all schools combined, tuition and fees accounted for 14 percent of income for basic operations. Federal agencies furnished more than half of the total amount for project research. The Public Health Service was the largest single source of funds for project research.

Unit costs of graduate instruction were derived in order to provide an index of total expenditures for graduate instruction. Wide differences were found among schools in average basic expenditures for graduate students (p. 70).

4. The monetary value of exchanges of service between the school of public health and other units of the university was measured in the course of the study. This analysis indicates that the net result was a contribution of approximately $113,000 worth of service by the schools of public health to other schools (p. 75).

5. By using the distribution of faculty time among the various functions as a base, the cost of maintaining the various components of the programs of the schools—namely, teaching, research, and community service—were computed. For all schools combined, 76 percent of the expenditures was for teaching, 17 percent for departmental research (other than project research) and 7 percent for community service (p. 77).

Needs of Schools of Public Health

1. In common with other institutions of higher learning, particularly schools providing instruction in the health professions, schools of public health are experiencing financial difficulty. Some schools have been obliged to curtail operations for lack of funds. Development in many important areas of teaching and research has been retarded (p. 81).

2. The deans estimated that 131 additional full-time faculty members would be required to raise standards of instruction to desirable levels. Principal expansion was felt to be necessary in the applied fields of instruction where an increase of nearly 70 percent of full-time faculty was considered necessary. A relatively smaller increase in faculty for the basic public health sciences was indicated (p. 83).

3. The 9 schools reported the need for an additional $1.8 million for basic operating expense for 1949–50 levels of enrollment. The largest proportion of this amount would be devoted to the employment of additional faculty (p. 89).

CHAPTER I. Introduction

SCHOOLS of public health in the United States provide special training to several groups of persons for work in official and voluntary agencies concerned with community health services. Health and other official agencies of local, State, and Federal governments and of international organizations, industrial plants, and voluntary health and welfare agencies employ thousands of full-time professional public health workers. Among them are persons trained in medicine, engineering, nursing, laboratory procedures, dentistry, veterinary medicine, statistics, nutrition, and education. Through their graduate training in the schools of public health [1] they acquire the knowledge needed to apply their previous basic training to the analysis of community health problems and to the organization and administration of integrated community health service (*1*).

Public health practice, which today embraces a wide range of special subjects, began some hundred years ago with the recognition of the relationship between environment and disease. Even before the bacterial causes of disease were established, such pioneers as Chadwick, Shattuck, and Snow demonstrated the importance of environmental sanitation in controlling disease. The practical control measures which they instituted made environmental sanitation the first component of modern public health practice. The provision of these services requires persons competent in such fields as engineering, sanitation, chemistry, and biology (*2*).

The identification of specific bacteria as the causative agents of a number of infectious diseases by Pasteur, Koch, and their pupils and Metchnikov's clarification of some of the mechanisms of the body's defense against disease gave new impetus to the development of public health services and contributed to the study, understanding, and control of the occurrence and distribution of disease in a community. As public health practice expanded to make use of these new fields of knowledge, the skills of physicians trained in epidemiology and communicable disease control, bacteriologists, statisticians, as well as personnel with competence in related fields, were incorporated in the public health movement.

Progress in sanitation and medicine brought under control many of the acute infectious diseases, with resultant increase in life expectancy and modifications of the age distribution of the population and of the

[1] Some of the schools of public health also offer undergraduate training leading to bachelors' degrees.

relative importance of individual causes of death. The scope of public health services broadened correspondingly. Health services to individuals were developed to control infant and maternal mortality, tuberculosis, and venereal disease. Similar methods are being used to combat heart disease, cancer, emotional illness, and many other diseases. The growing realization of the interdependence of individual and community welfare accompanied and stimulated these public health activities. To meet these changing requirements, public health agencies needed still other kinds of personnel—nurses, social workers, educators, social scientists, and administrators.

This evolution of public health service represents an area of organized community effort that is growing and changing rapidly in scope, content, and method. Each change is accompanied by parallel changes in the types of personnel needed to plan, organize, and administer the new services (*3*).

In the early days of public health activity in this country, official and voluntary health agencies were staffed by persons with little or no academic training for community health services, and practical experience was the only means of acquiring competence in this field (*4*). The need for trained personnel increased with the expansion of State and local public health programs with the aid of Federal grants to States for public health activities and training under the Social Security Act of 1935. Various training devices were developed to meet this need—institutes, short courses, apprenticeships, and isolated graduate courses in certain subjects (*5*). These courses and even degrees in public health were offered by many colleges and universities (*6*).

In 1941, seven schools (Columbia, Harvard, Johns Hopkins, Michigan, North Carolina, Yale, Toronto) formed an Association of Schools of Public Health for the exchange of information of mutual interest concerning the graduate education of professional personnel for service in public health and to promote and improve the education and training of such personnel. An institution may be eligible for membership when it is conducting a school or department devoted to graduate teaching in public health. A vote of two-thirds of the members of the Association is necessary for election. Membership in the Association is not contingent on accreditation by the American Public Health Association (*7*, *8*).

Aware of the difficulty of evaluating the various academic courses offered, the Committee on Professional Education of the American Public Health Association issued a statement in 1942 suggesting the minimum educational facilities for graduate courses in public health. The Commmittee believed that this statement would be useful to appointing bodies, teaching institutions, and students who contemplated professional careers in public health (*9*).

Because of its own staffing requirements and the development of State and local health agencies, the United States Public Health Service joined the Association of Schools of Public Health in asking the American Public Health Association to develop a means of accrediting graduate training in public health. The responsibility for establishing criteria and reviewing the facilities provided by any institution applying for approval of graduate training in public health was assigned to the Committee on Professional Education subject to final decision by the Executive Board of the Association (*10*). In 1946, Professor C.-E. A. Winslow was appointed Consultant on Accreditation and, working with the directors of the schools of public health, developed criteria (*11*) for accreditation and initiated inspections of schools.[2] (See appendix A for criteria for accreditation.)

In May 1947, the Executive Board of the American Public Health Association released the first list of institutions accredited for the master of public health and doctor of public health degrees. The list included 9 schools[3] in the United States accredited for the master of public health degree and 7 of them for the doctor of public health degree. Later in 1947, one other school (Tulane) was accredited for the master of public health degree. In 1948, one of the schools originally accredited for the master of public health degree (Vanderbilt) discontinued its program. In 1950, Tulane University was accredited for the doctor of public health degree and the University of Pittsburgh for both the master's and doctor's degrees.

In 1949, the American Public Health Association established criteria for the accreditation of masters' degrees other than the master of public health (such as master of arts, master of science, master of science in public health, or master of education) with specialization in the field of public health education. This accreditation is limited to institutions already accredited for the master of public health degree (*12*). Schools of public health can admit students interested in a career in health education who do not meet the admission requirements for the master of public health course but appear otherwise qualified. This step was taken in an effort to stimulate the training of personnel in this field.

The objective inspection and accreditation of the programs of the schools of public health, the definition of the educational qualifications for specialists in public health proposed by the American Public Health Association's Committee on Professional Education, and the adoption of personnel merit systems by State health agencies have

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[2] The American Public Health Association's accreditation program has not included the engineering schools, some of which offer graduate work in sanitary or public health engineering.

[3] The universities of California, Columbia, Harvard, Johns Hopkins, Michigan, Minnesota, North Carolina, Vanderbilt, and Yale.

helped raise the professional stature of public health workers. The American Public Health Association through its meetings, committees, and publications also provides the forums which are essential for the communication of experience and research findings.

The rapid expansion of public health knowledge and practice has raised a number of basic problems with regard to the objective, organization, and methods of education in this field. Postwar economic changes and the demands imposed by the continuing state of international tension have created other problems of like concern to the schools of public health and all levels of government. Recognizing these problems, the Association of Schools of Public Health, in 1949, asked the United States Public Health Service to undertake a study of the schools of public health, as the first step in this needed reevaluation. The Association felt that such a study would provide data that would be useful to the schools themselves and their parent universities in planning the future development of professional education in public health. A study was therefore undertaken in 1950 by the Division of Public Health Methods. The study was designed to achieve the following objectives:

1. To describe the schools in the United States having accredited public health programs with special reference to organization, staffing, student body composition, and teaching programs.
2. To determine the financial status and needs of schools of public health and to appraise the potentialities of the schools for increasing the number of students trained.

Information was accumulated relating to the year 1949–50 from the nine schools of public health accredited for that year. Methods were devised to gather comparable information from each school concerning its programs of instruction, research, and service to the community; the organization of the school; staffing; student-body composition; and the financial status and needs. A combination of methods was developed. Deans, faculty members, administrative officers, and other officials of the schools and universities were interviewed by members of the study staff. In addition, administrative officers of the schools filled out schedules calling for certain quantitative data concerning student-body and faculty composition, courses, research, income, and expenditures. The staffs of the schools furnished information on their academic background, relationships to the school or other units of the university, activities, and distribution of time. Students filled out schedules calling for information on previous training and experience, course of study at the school, and the source and amount of scholarship support.

The data accumulated by these methods form the basis for this report. Partial information of a similar nature was obtained from

the Graduate School of Public Health of the University of Pittsburgh for the year 1950–51, its first year of operation. These data are not included in this report, however, because they are not complete, because they do not relate to the study year, and because they do not reflect operating experience comparable with the other schools.

This report describes the educational programs, resources, financing, and needs of schools of public health. No attempt is made to evaluate the effectiveness of professional education in public health in terms of current and future requirements or to consider questions of quality of such education.

CHAPTER II. The Schools and Their Programs

SCHOOLS of public health have in common three basic functions—to provide training in the public health sciences and in public health practice, to conduct research, and to participate in the development and improvement of community health services. Nevertheless, they vary widely in emphasis and in approach to their objectives. These variations are evident in the descriptions of the schools, their programs, resources, financial status, and needs which form the basis of this report.

For the year covered by this study (1949–50), 9 schools in the United States[1] were accredited by the American Public Health Association for the master of public health degree, 8 for the doctor of public health degree, and 4 for a special master's degree in public health education (distinct from the master of public health degree). The accreditation status of individual schools is shown in table 1.

Organization and Administration of the Schools

The educational aims, the sources of support, and the evolution of each of the schools of public health influence the organization of the school and its relationship to the medical school and other parts of the university. Although the patterns of organization are not clear cut, the schools can be classified in three broad groups according to the degree of administrative autonomy. Four schools of public health (California, Harvard, Johns Hopkins, Michigan) are independent units within their universities. At Columbia, Minnesota, and North Carolina the schools are units within organized divisions of medical sciences. At Tulane and Yale they are organized as medical school departments. Under each of these types of organization and administration the individual schools meet the accreditation requirement of "practical autonomy."[2]

Four of the universities with which the schools of public health are affiliated (California, Michigan, Minnesota, North Carolina) are State institutions. The other five (Columbia, Harvard, Johns Hopkins, Tulane, Yale) are private institutions. Data presented in a later section of this report show certain differences in the financial structure of the private and public schools.

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[1] In Canada, the School of Hygiene of the University of Toronto was accredited for the diploma in public health (comparable to the master of public health) and for the certificate in public health (comparable to the master's degree in public health education).

[2] See appendix A for accreditation requirements.

The administrative and geographic relationships between the schools of public health and other units of the university affect somewhat the range of courses available to public health students as well as the general academic program of the schools. Differences in the extent to which the resources of other units of the university are used by the schools of public health and the extent to which the public health faculty participates in teaching other university students are traceable in part to the different relationships within the university (*13*). In the field of sanitary engineering, for instance, some public health schools use the facilities of the engineering school of the university while others maintain their own faculties for this subject. Still other schools use faculties from both the school of engineering and the school of public health. Because of the complexity of these relationships it is extremely difficult to measure accurately the volume and types of exchanges of services within even a single university.

Table 1. Institutions in the United States accredited by the American Public Health Association for the academic year 1949–50

Institution	Degrees accredited		
	Master of public health (M. P. H.)	Doctor of public health (Dr. P. H.)	Master's degree in public health education other than the M. P. H.
California, University of—School of Public Health	X	X	
Columbia University—School of Public Health	X	X	
Harvard University—School of Public Health	X	X	X
Johns Hopkins University—School of Hygiene and Public Health	X	X	
Michigan, University of—School of Public Health	X	X	
Minnesota, University of—School of Public Health	X		X
North Carolina, University of—School of Public Health	X	X	X
Tulane University—Department of Public Health	X	X	
Yale University—Department of Public Health	X	X	X

Source: American Journal of Public Health 39: 1044-1045, August 1949.

Although the technical arrangements for granting degrees differ among the schools, the schools of public health in effect are responsible for determining which students receive degrees. In addition to the degrees for which the American Public Health Association accredits institutions, several other degrees are granted, some (such as master of sanitary engineering or master of hospital administration) in specific fields of public health and others (such as master of science or doctor of science) in more general areas. At some of the universities, students technically enrolled in any graduate school may take all or nearly all their work in the school of public health and therefore should be considered as students of the schools of public health.[3]

[3] A discussion of the degrees offered will be found in ch. III.

Admission Requirements

The American Public Health Association criteria for accreditation specify certain entrance requirements for admission to candidacy for the degrees of doctor of public health, master of public health, and master of science in public health education. (See appendix A.) Applicants for the doctor of public health degree and physicians, dentists, or veterinarians seeking the master of public health degree are, in general, admitted if they meet these criteria. Some schools discourage physicians over 50 years of age from registering for the master of public health degree, and some schools require previous public health experience.

At most of the schools, nonphysician applicants for the master of public health degree must meet admission requirements over and above the basic criteria specified by the American Public Health Association.[4] The most usual of these additional requirements concern field experience. Some schools require such experience regardless of previous graduate academic work, some require more than 3 years of field experience in lieu of academic training, and some require experience with "responsibility." Over and above the basic admission requirements, additional subject-matter requirements are made for some of the special programs of study.

Entrance requirements, admission policies, or actual admission procedures are often more stringent for the nonphysician applicants than for the physician applicants. With some exceptions, a physician who is under 50 years of age and who received his medical degree from an approved medical school in the United States or Canada is almost certain to be accepted as a candidate for the master of public health degree. A physician from the United States over 50 years of age (or in some cases over 35) will probably have to be sponsored by a State or local health department if he is to be admitted as a degree candidate. Most schools admit most foreign-trained physicians only as special students and not as degree candidates; if the student demonstrates his ability to do satisfactory classwork, he is allowed to become a candidate for a degree later on in the year and usually receives retroactive credit for the courses taken.

In addition to graduate education, which all schools provide, four of the schools of public health (California, Michigan, Minnesota, North Carolina) offer undergraduate instruction leading to a bachelor of science degree in one of several fields of public health.[5] Appli-

[4] The American Public Health Association's basic criteria are: at least a year's graduate work in some field of public health *or* at least 3 years of experience in some field of public health practice or in teaching.

[5] At the time of this study, California offered the only undergraduate program in subjects other than public health nursing. Subsequently, Michigan established undergraduate programs for nonmedical administrators and for sanitarians.

cants for undergraduate degrees must usually meet the regular university entrance requirements. Candidates for the bachelor of science degree in public health at one school (California) must have satisfactorily completed the equivalent of 2 years of college work. At the schools that offer the bachelor of science degree in public health nursing (Michigan, Minnesota, North Carolina), graduation from an approved school of nursing is required in addition to the usual college entrance requirements. The further requirement of registration as a professional nurse is made at Michigan and North Carolina, and the latter also requires 2 years of college work.

Problems of Student Selection

As the categories of nonmedical personnel applying for admission to the schools increase, the problem of selecting the best students becomes more difficult. The wide differences in educational background and experience of the candidates and the variety of their goals among the public health specialties multiply the difficulties in developing uniformly objective admission standards.

The problem of attracting well-trained physicians to public health careers was of real concern to all the deans. Most deans felt that the physicians enrolled in schools of public health do not represent a fair cross section of medical school graduates, and that the quality of medical applicants fell during and immediately after World War II. The problem is complex but highly significant to future progress of public health. Whether because of comparatively greater professional opportunities, emoluments, and prestige in other medical specialties, or because of the dominant interest and orientation of young physicians towards clinical medicine, current incentives are apparently not sufficiently strong to attract either the numbers or types of medical students needed in public health. Although several deans indicated that the situation was improving at the time of the study, most agreed that this continues to be a serious problem which deserves careful consideration. In general, deans were satisfied with other groups of students and were particularly impressed by the engineers admitted to schools of public health.

Departmental Structure

The way in which the courses of instruction are organized within the schools varies greatly from school to school. At some schools the courses are organized into a comparatively large number of coordinate departments. Other schools have fewer departments, with or without organized subdivisions. Still other schools have no clear-cut departmental structure. This variation presents difficulties in the analysis of the data on staff, students, and expenses in terms of

specialty fields. Certain expedients have been adopted, therefore, for the purposes of this study. Definitely organized divisions were considered as equivalent to departments; for schools without formal departmental structure, department-equivalents have been selected on the basis of information given by the faculty members regarding their chief teaching and research interests.

Disregarding variations in the names given by the schools to similar fields of instruction (that is, departments), the following classification was adopted for purposes of this report:

Public health administration or practice, including field training
Biostatistics or vital statistics
Public health education
Environmental sanitation, including public health engineering, sanitary engineering, sanitary science
Epidemiology
Hospital administration
Industrial hygiene
Maternal and child health
Medical economics, including medical care administration
Microbiology, including bacteriology, public health laboratory
Public health nursing
Nutrition or biochemistry
Physiological hygiene or physiology
Tropical public health, including parasitology
Other, including cancer control, public health dentistry, experimental medicine, mental hygiene, personal health, tuberculosis, and venereal disease control.

In any particular school, the absence of staff, students, or expenditures for a specific department does not necessarily mean absence of instruction in that subject—it may be taught in some other department. In certain instances, one or more specialized subjects are taught in a particular department because the faculty considers them to be closely related to the department's main interest. For example, medical care is taught in the department of public health practice at Harvard. In other instances, new subjects are developed under the aegis of an established department until curriculum and faculty expand sufficiently to justify recognition in the organizational structure. In some cases, more than one subject is taught in a department when sufficient numbers of qualified faculty are not available to permit the organization of separate departments. Grouping activities, faculty, students, and expenditures according to this classification of departments, although not a precise method of analysis, makes limited comparisons among the schools possible.

Program Characteristics

The 3 major functions of the schools of public health—teaching, research, community service—are represented with varying emphasis in the 9 schools. Although separate consideration of these three areas of activity assists in describing the schools' programs, it should be recognized that basically they are interrelated. Research, by broadening and deepening knowledge in the biological and allied sciences relating to public health, enriches the content of the teaching program and stimulates a spirit of investigation and objective observation. Community service, like the clinical activities that are a part of medical education, provides the faculty with teaching material and a training ground for students. Community service, furthermore, gives the schools an important area for research in public health. Investigation and analysis of community health problems, evaluation of the effectiveness of current public health techniques and programs, and pilot studies and demonstrations of new or proposed health measures contribute to advances in both the basic sciences and the practice of public health.

Research

Measured by both staff time and expenditures, research constituted an important part of the activities of the schools of public health during 1949–50. Individual staff members, in addition to indicating the proportion of time devoted to research, also gave information on the field of their research. The full-time personnel [6] of all academic ranks and the part-time personnel in the top three ranks [7] were asked to specify the research in which they were participating. Of the 372 professional persons to whom this question applied, 256 were engaged in research, though 26 of them failed to specify the field.

At least 67 of the faculty members were conducting research on infectious diseases—especially poliomyelitis and syphilis. Forty-five of the faculty were working on various problems in the basic sciences, such as physiology, biochemistry, or statistical theory. Research on environmental conditions (including such subjects as accidents, industrial hazards, housing, and sanitation) was reported

[6] This group consists of faculty members who are employed full time in the school of public health and those who are employed full time in the university and give part time to the school of public health.

[7] Part-time personnel below the rank of assistant professor were not asked to report their research projects because few of these persons were engaged in a research project that was a direct concern of the school.

by 38 of the professional staff. The number of faculty members reporting research in various fields for all schools combined was as follows:

Research field	Number of faculty
Total	484
Infectious diseases	67
Basic sciences	45
Environmental conditions	38
Administration	32
Maternal and child health	25
Noninfectious diseases	19
Teaching methods	4
Unspecified	26
No research	116
Not asked to report research	112

Nearly 40 percent of the faculty members reporting research were at two schools (Harvard, Johns Hopkins).

Although the faculty of the schools reported as research those projects summarized above, it should be kept in mind that the distinction between research and certain kinds of community service is often difficult to make. Demonstrations of community health services and community surveys that may be designed to meet specific needs in participating communities are also important sources of new knowledge.

The members of public health school faculties frequently conduct surveys of health organizations and programs at the request of community health agencies. Yale, over a long period of years, has undertaken a number of surveys of health services for both local and State agencies, providing a basis for considerable reorganization of service in the areas studied. Harvard has recently been identified with a survey of local health services in the city of Worcester. The school in Michigan has been responsible for surveys of health services at the request of local, State, and Federal health agencies. The North Carolina school has made from 2 to 12 surveys of local health departments in the southeastern States in each of the past several years.

Community Service

Participation in community activities by a school's faculty offers many advantages to the school. Teaching improves as faculty members and students investigate and keep abreast of community health problems and participate in efforts to solve those problems. The community also gains from such association, receiving assistance and

as well as State and national health problems and practices. The deans pointed out that members of the school faculty are often called on to give impartial opinions on problems too controversial for the community itself to handle. The community service responsibilities of the schools include continuation or extension courses of instruction in public health, committee and consultation work of individual faculty members, service projects, and community surveys. The last-named have been discussed under research.

Continuation or Extension Courses

Five of the schools arrange regular and frequent courses for people outside the university (Johns Hopkins, Michigan, Minnesota, North Carolina, Yale). The other four schools furnish staff for occasional institutes, usually for people in the health professions. The North Carolina School of Public Health is responsible (with the State Health Department) for a series of regular courses for public health personnel within the State and southern region, conducted by the school's field-training department. These courses are given for public health nurses, sanitarians, and venereal disease investigators, many of whom need additional training to meet merit-system requirements. The school also provides courses for other professional people such as health officers and public health dentists. In addition, it is responsible for instruction in health subjects at the North Carolina College at Durham, an institution for Negro students.

Yale provides occasional courses, mainly for school teachers, in collaboration with voluntary organizations such as the cancer and tuberculosis associations. This school also makes the teaching arrangements for a monthly conference of health officers of the State. The school of public health in Minnesota uses two channels for community teaching. One is the summer school of the university where degree-credit courses in public health subjects can be taken by people who are not full-time students at the university. The other channel is the Continuation Center of the University of Minnesota, a special branch established to provide educational opportunities for citizens of the State. It is a residential college offering short courses that do not lead to academic credit. Many courses on public health topics have been conducted by staff of the school of public health. At the time of this study, Johns Hopkins also had somewhat similar responsibilities, including a monthly seminar for health officers in the State of Maryland and seminars to provide orientation in mental health problems for the personnel of the State health department. Institutes for local health officers have also been arranged at Tulane and Harvard, and a seminar on medical care problems for members of the local medical society is conducted by the California school.

The staff of the Michigan School of Public Health ranks its continuation courses in specialized fields of public health among its most important responsibilities. These inservice training courses were started with funds from the Kellogg Foundation but are now administered and financed through the regular school budget. The courses cover such subjects as the relation of nutrition to maternal and child health, housing (for health officers and engineers), air pollution, food handling, the health of the school child (for health officers and school administrators), industrial hygiene and human relations (for safety personnel), and radiological health (for all public health personnel). The instruction is provided by the school faculty supplemented by other experts. In addition, conferences of national authorities in special phases of public health are arranged by the School of Public Health to consider problems of nationwide importance. The National Conference on Local Health Units held at Ann Arbor in 1946 was of this type.

The Columbia and Michigan schools of public health assume the administrative responsibility for this kind of teaching. The central administration of the University of Minnesota makes the arrangements for the summer school and the Continuation Center makes its own arrangements. At Tulane, responsibility lies with the postgraduate division of the medical school, and at the California school, with the extension division of the university.

These extension courses and seminars keep the schools of public health in touch with community needs and keep people who are interested in community health work in contact with the schools. The courses help in raising standards of community health services and may bring recruits to the schools for additional training.

Committee and Consultation Work

In addition to the schools' participation in community services, individual staff members are frequently called upon for advice and assistance by many agencies—governmental and voluntary. Moreover, members of the faculty frequently serve as consultants or as members of committees and advisory bodies set up to aid in the administration of health departments or of special programs of those departments.

Service Projects

The close relationships with the State health departments maintained by the schools in Minnesota and California represent a significant community service. In Minnesota, the value of this longstanding service has been noted in reports of the State health department. Tulane's school of public health has taken part in the development of

regional health services in six counties in Mississippi, a project for which the Tulane medical school has assumed overall responsibility. The Harvard School of Public Health is jointly responsible with a local community for a mental health study that involves service as well as research.

The Johns Hopkins school has assumed responsibility for providing some direct service in the Eastern Health District of Baltimore. In addition, the members of the department of public health administration are participating in a maternal health program in Puerto Rico; the bacteriology department has been designated as a center for the spirochete study of the World Health Organization; and the laboratories of the parasitology department have been named as a taxonomic center for the Western Hemisphere by the International Health Division of the Rockefeller Foundation.

Teaching

Present-day teaching at the schools of public health has a twofold purpose. The first and more important is the development of a broad understanding of the fundamentals of public health for all students—graduate, undergraduate, or special. The second purpose is the training of specialists in various types of community health activities. In approaching this second goal, wide variation is found among the schools, depending on a number of factors, such as the location of the schools, the needs of the surrounding areas, and the special interests of the faculty. For example, in the study year, 5 of the 9 schools had special curriculums in hospital administration, 4 schools offered courses in public health dentistry, and 4 had functioning departments of public health nursing. Three schools offered only a single course in public health education. The content and focus of the schools' instruction, according to the deans of the schools, mark the increased interest in adult health, mental health, and socioeconomic conditions. A relative decrease in emphasis on communicable disease control was also noted.

The past few years have brought gradual changes in teaching methods. Instead of formal lectures to large classes, the current trend is toward informal discussions with small groups of students. Instruction for small groups usually affords a better opportunity for developing the health-team concept—teaching the different professional groups to work together. The comparatively small number of graduate students permits considerable individualization in the arrangement of courses and training experience at all the schools. It provides the opportunity for personal contact between students and members of the faculty which is essential in meeting the special needs and in developing the special interests of the students.

The deans mentioned increasing concern with the problem of so integrating the courses that the student can appreciate the relationships of the different subjects. The organization of general seminars, at which department lines were crossed, was a method frequently used for this purpose. So-called core courses have been developed in a few schools for the same purpose. This problem continues to be the focus of active experimentation, since, at most schools, the deans were not satisfied that this objective of integration was being adequately met.

The training of graduate students constitutes the primary responsibility of the schools of public health, although 4 of the 9 schools (California, Michigan, Minnesota, North Carolina) also train undergraduate students. In addition to the teaching arranged primarily for their own students, all the schools provide some teaching assistance to the medical schools or other units of the university. At some schools, this additional teaching consists of occasional lectures only, but at others some of the faculty devote a substantial proportion of their time to such duties. On the other hand, the students enrolled in the school of public health take some courses conducted by other units of the university. The extent to which such students enroll in courses outside the school of public health varies with the school and with the student's major subject. Some schools depend heavily on other university departments for supplementary courses, particularly in subjects such as sociology, government, education, business administration, speech, journalism, and some of the medical sciences.

Quantitative data on numbers of courses, class registrants, and credit hours of instruction accumulated for this study and classified according to subject fields affords some idea of the relative emphasis given to various fields of instruction. Table 2 shows the distribution of credit hours of instruction among graduate and undergraduate students in schools of public health and students of other schools.

The distribution of student credit hours of instruction should not be considered apart from other information on the educational program of the school. It is obvious, of course, that equal weight cannot be assigned to a student credit hour of graduate instruction and to a student credit hour of undergraduate instruction. As a general rule, graduate instruction is given in small groups and is characterized by a large amount of individual supervision and instruction. On the other hand, undergraduate instruction is characterized by large classes and is relatively less demanding in terms of faculty time. With these qualifications, the table is of interest as it provides a picture of the distribution of instruction for each group of students.

In the study year, the largest number of graduate student credit hours of instruction was given in the field of public health administration, representing 13 percent of the total student credit hours of

graduate instruction. Next in order of number of student credit hours of graduate instruction came biostatistics, followed by environmental sanitation, microbiology, hospital administration, public health education, epidemiology, and tropical public health. These fields together contributed an additional 63 percent of the total credit hours of graduate instruction in the 9 schools. The table also shows the relative emphasis given to different fields of undergraduate instruction, the major emphasis in this field being placed on public health nursing which accounted for over 40 percent of the total undergraduate instruction given by all 9 schools of public health.

Table 2. Number of courses, class registrants, and credit hours in the curriculums of 9 schools of public health according to field of study—1949–50 [1]

Field of study	Number of courses	All students		Students of schools of public health				Students of other schools	
				Graduate		Undergraduate			
		Class registrants [2]	Credit hours [3]	Class registrants [2]	Credit hours [3]	Class registrants [2]	Credit hours [3]	Class registrants [2]	Credit hours [3]
All fields	630	16,388	51,704	9,424	20,307	2,731	10,961	4,233	11,406
Public health administration	54	2,047	6,301	1,304	3,781	378	1,383	365	1,137
Biostatistics	55	2,032	6,128	1,012	3,433	97	267	923	2,428
Public health education	51	1,326	3,001	1,078	2,450	106	230	142	303
Environmental sanitation	94	1,467	4,280	1,000	2,949	244	656	223	681
Epidemiology	41	1,081	3,380	725	2,412	257	629	99	330
Hospital administration	44	1,056	2,473	1,048	2,465			8	8
Industrial hygiene	40	530	1,134	385	728	46	112	108	294
Maternal and child health	47	1,943	5,537	322	958	290	950	1,331	3,629
Medical economics	24	530	1,245	346	764	22	66	171	415
Microbiology	32	559	3,452	421	2,571	105	724	33	157
Public health nursing	86	1,223	6,272	377	1,389	681	4,625	165	258
Nutrition or biochemistry	33	614	1,814	307	1,259	111	270	136	276
Physiological hygiene	13	238	1,087	79	470			159	611
Tropical public health	44	502	2,037	488	2,360	30	137	35	131
Other fields	62	1,162	3,017	472	1,384	355	891	335	739
Cancer control	5	115	405	38	184	76	219	1	2
Public health dentistry	9	90	144	38	55	14	14	38	75
Mental hygiene	19	987	1,849	236	746	137	595	264	598
Venereal disease control	19	270	619	160	399	78	156	32	64

[1] Data from administrators' schedules.
[2] Total numbers of class registrations, not an unduplicated count of individuals.
[3] Sum of registrations for each course multiplied by number of course credits.

The distribution of credit hours of instruction for students of other schools clearly identifies the areas of most general interest. Maternal and child health accounted for the largest amount of instruction for students of other schools, probably because instruction in this field is incorporated in the curriculums of schools of education and schools of social work. Biostatistics and public health administration are other fields in which a substantial amount of instruction was provided for students of other schools. These 3 departments accounted for 63 percent of all credit hours for students using the schools for courses useful in their work at other units of the universities.

The aggregate data for all nine schools, of course, mask marked variations in the distribution of instruction in the individual schools. It will be recalled that in the study year only four schools provided instruction to undergraduate students. Wide variation among schools also appeared in the degree of interchange maintained between the school of public health and other schools of the university.

The courses given by schools of public health can be grouped in two main categories. The first group includes subjects that represe the basic public health sciences, such as biostatistics, epidemiolog microbiology, nutrition or biochemistry, physiological hygiene, an tropical public health. The second group comprises the subjects tha represent the application of public health principles and technique and includes public health administration, public health educatio environmental sanitation, hospital administration, industrial hygien maternal and child health, medical economics, and public healt nursing. This second group also includes the curriculum subject focused on control programs such as cancer, public health dentistry mental hygiene, and venereal disease.

All schools of public health give some courses of each kind and bot kinds of courses are required of all candidates for the master o public health degree.[3] The differentiation between basic scienc courses and those in public health practice is not clear cut since man subjects cover such broad areas that they involve both the scientifi bases for public health activities and their application in health pro grams. Furthermore, many differences appear in the content o courses as taught at the several schools. Nevertheless, classificatio of subjects into the two broad areas described above is as valid in th education of public health workers as it is in the training of physicians Although the same distinction between basic science and applie courses is not made in the organization of instruction in schools o public health as in medical schools, such a classification nevertheles facilitates the description of curriculum.

Courses in Basic Public Health Sciences

The most important objective of the instruction in the basic public health sciences is to provide all students with a sound understanding of the scientific principles and methods that are used in public health practice. In addition, students are trained for service, research, and teaching responsibilities in individual subjects.

BIOSTATISTICS.—Nearly all degree candidates at schools of public health are required to take at least one course in biostatistics. All

[3] The required courses for this group of students include public health administration, epidemiology, biostatistics, and environmental sanitation.

the schools have departments of biostatistics. Teaching of this subject has two objectives—to train a limited number of specialists in statistics and to give all students some knowledge of statistical techniques and methods as a means of developing an analytic approach to problems in public health.

The effect of the recent changes in the scope of public health activities on courses in biostatistics has not been as direct as in some other subjects, although now more and more of the problems and illustrative materials being used are drawn from chronic disease and socioeconomic data. At one school (Columbia) the head of the biostatistics department said that he had recently changed the emphasis of his teaching to put more stress on the analysis of followup data in studies of long-term diseases.

Most biostatistics courses consist of lectures and laboratory periods. The lectures frequently are given to very large classes but laboratory work in small groups makes it possible for students to get a considerable amount of individual instruction. Very little fieldwork is provided in connection with the regular courses in biostatistics. At one school (Johns Hopkins), however, a student working for a master's or doctor's degree in statistics might have fieldwork in the city or State health department or in the university hospital.

Epidemiology.—This subject gives the future health worker an approach to the mass concept of disease in contradistinction to the individual approach of the physician or nurse. Instruction in this subject is designed, at all schools, to develop an understanding of the principles of epidemiology and to give the health worker training in the diagnosis of community problems. Principles are emphasized rather than techniques. Because their epidemiology has been well established, individual communicable diseases are frequently the focus of the teaching—not so much to emphasize the specific diseases as to develop principles. In recent years, increasing emphasis has been put on the application of epidemiology to the problems of noncommunicable and chronic diseases and accidents.

The organizational framework for teaching epidemiology varied considerably among the schools of public health. Although courses in the subject were provided at all 9 schools, only 6 had separate departments during the study year. At 2 schools (Minnesota, North Carolina) epidemiology and public health administration functioned as joint departments and 1 other school (Yale) had no department or division of epidemiology, as such. At three of the schools with organized departments, the epidemiology departments were responsible for some if not all of the courses in microbiology (California, Columbia, Michigan).

Epidemiology is taught mainly through lectures and laboratory work. Little fieldwork is provided in connection with the basic courses in epidemiology. At two schools (California, Johns Hopkins), however, students taking special-study courses have an opportunity to participate in fieldwork.

Microbiology and Bacteriology.—In the study year, 2 schools (Harvard, Johns Hopkins) had organized departments of bacteriology and 1 other school (California) had a department of public health laboratory. At three schools (Columbia, Michigan, Minnesota), courses in bacteriology or laboratory practice were given by the department of epidemiology or the department of public health administration. At two other schools (Tulane, Yale) special courses in bacteriology were given by medical school faculty.

The functions of the courses in bacteriology and in public health laboratory differ somewhat. Bacteriology is usually taught primarily for its value as a fundamental science, although some training for specialists is provided. Public health laboratory courses for graduate students are designed chiefly to train laboratory administrators or to give health officers sufficient knowledge of laboratory practices to enable them to evaluate laboratory performance. The main purpose of the undergraduate program in public health laboratory (given at the California school of public health) is to give technicians knowledge of the place of laboratory work in the whole field of public health.

Three schools (Harvard, Johns Hopkins, Michigan) arrange with State health agencies for specific courses in practical laboratory work. One school (Johns Hopkins) provides summer field training for its specialist students in the Communicable Disease Center of the United States Public Health Service, and in the laboratories of the New York State Health Department and the New York City Health Department.

Nutrition or Biochemistry.—The fact that nutrition is included in the curriculums of schools of public health is the result of the changing concept of the training needs of public health students. The incorporation of this subject in the curriculum expresses the growing recognition of its basic importance to all aspects of health, and of the fact that community planning and organization are essential in maintaining a high level of nutrition.

Some nutrition courses were provided in the study year at all nine schools of public health. Five schools (California, Columbia, Harvard, Johns Hopkins, Michigan) had students majoring in this subject, and at one other school (North Carolina) the work was being reorganized to build up a curriculum for majors. Eight of the nine schools had organized departments of nutrition or biochemistry and at the other (Minnesota) nutrition was taught with physiology.

Some of the courses in nutrition included laboratory work, but the seminar type of instruction was the most common. Field training

was not a conspicuous part of the nutrition courses, although some field observation was included at three schools (Columbia, Harvard, Michigan). One school (North Carolina), which was reorganizing its curriculum, plans to provide a full quarter of field training in nutrition, to be given in a health department setting and to consist of actual participation in the program of the health department.

PHYSIOLOGICAL HYGIENE OR PHYSIOLOGY.—Four schools (Harvard, Johns Hopkins, Minnesota, Yale) had organized instruction in physiology in the study year. At two of the schools (Minnesota, Yale) the work was organized in somewhat separately operating laboratories of physiological hygiene. At Johns Hopkins the name of the department was changed during the study year from physiological hygiene to environmental medicine, which included teaching in audiology and speech and in industrial hygiene as well as in physiology. One other school (Tulane) offered a course in physiological hygiene taught by the staff of the public health administration department. In connection with the small amount of instruction offered in this subject, Dr. Winslow (*14*, p. 163) said: "This seems strange, since the problems relating to nutrition, fatigue, recreation, illumination, and the influence of the atmospheric environment upon health and the like will probably be more important than the control of communicable disease in the future development of public health in the continental United States."

The main function of the instruction in physiology is the provision of basic physiologic knowledge as part of the general training of public health students, with particular emphasis on the physiology of the aging process and of the degenerative diseases. Courses in physiological hygiene at all four schools with organized departments included lectures, informal discussions, and laboratory exercises.

TROPICAL PUBLIC HEALTH AND PARASITOLOGY.—Six of the nine schools (Columbia, Harvard, Johns Hopkins, Michigan, North Carolina, Tulane) had departments of parasitology or tropical medicine during 1949–50.[9] The other three schools apparently provided no teaching in this field. At one school (Columbia), parasitology was used to develop the preventive concept in medicine since, as the dean said, "there isn't a single parasitic disease for which there is not a good measure of prevention."

Considerable laboratory work is included in the courses in parasitology. Students have little or no fieldwork during the academic year; a few collecting trips are arranged in connection with specific courses, but little else. Informal arrangements are sometimes made for summer field training, especially for foreign students. The Michi-

[9] Tulane has departments of both tropical medicine and parasitology. At the Michigan school, the department of tropical diseases was in the process of being merged with the department of epidemiology.

gan Biological Station and the Communicable Disease Center and the Rocky Mountain Laboratory of the Public Health Service are used most frequently for these summer training programs.

Courses in Applied Fields of Public Health

The descriptions of the courses in the basic public health sciences, given in the preceding section, indicate that the courses which emphasize theory and principles include some elements of application of principles. The courses described in this section, however, are directed primarily at the study of the application of basic sciences in the organization of public health programs, both general and special.

PUBLIC HEALTH ADMINISTRATION.—Public health practice or public health administration [10] is taught in each of the nine schools of public health and is a required subject for all candidates for the master of public health degree. In some schools, the departments of public health administration or public health practice include a variety of subjects which in other schools are organized as separate departments. Hospital administration, medical care administration, health education, mental health, maternal and child health, tuberculosis control, venereal disease control, and cancer control were all included in departments of public health administration at one or more schools during the year of this study. Quite frequently a new field of public health is introduced in the curriculum by inclusion in the public health administration department. For example, courses in mental health may be started in the school's department of public health administration and later—as the teaching program develops and as faculty is added—may be organized in a separate department.

The broad scope and philosophy of public health are stressed in public health administration courses more than in any other, and in public health administration courses the student acquires perspective on the interrelationships of public health programs and on the functions of each program. More specifically, public health administration courses deal with administrative principles, techniques, and procedures. At all schools, public health administration and practice courses are concerned with both the theoretical and the practical aspects of the subject. The relative emphasis, however, varies with the overall objectives of the school and with the philosophy of those responsible for the teaching. To varying degrees, instruction in public health administration in the several schools is designed to teach basic principles in order to equip students to meet anticipated conditions over the next 25 years and to prepare health officers to do a better job within the present pattern of health services.

[10] Although these terms are not synonymous, they are often used interchangeably.

All heads of departments of public health administration have found that the increasing scope of public health programs has changed the concept of training needs. A few years ago, health departments were concerned primarily with problems of environmental sanitation and communicable disease control. Now their fields of activity include chronic diseases and the provision of direct personal health services to individuals. As a consequence, the basic principles of public health practice and administration are emphasized in the courses at schools of public health to a greater extent than was true a few years ago. More and more the interrelationships among the various phases of public health programs are stressed in courses in public health administration.

Public health practice courses are usually conducted as informal seminars and discussion groups rather than as lectures. To some extent, fieldwork is also part of the teaching of public health administration at all nine schools. At some schools, fieldwork consists of observation only, while at others the students participate in surveys of health departments, in other investigations, or in the administration of services. Some schools include fieldwork as part of a course in public health practice, others provide separate fieldwork courses. Special field-training arrangements are often made for foreign students so that they may spend the summer months before or after the academic year in such supplementary training. Various resources are used by the schools for field training. Local health departments in areas adjacent to the schools are probably the most frequent resource, though State health agencies are also used frequently. One school (Johns Hopkins) has a field-training area for which it has some administrative responsibility, and other schools are considering the development of similar areas.[11]

PUBLIC HEALTH EDUCATION.—The changing scope of public health activities has been accompanied by modifications of courses in public health education in the schools of public health. A few years ago, public health education concerned itself largely with preparing newspaper articles, pamphlets, posters, and motion pictures—all designed to "sell" public health to the people. Now, public health education tries to develop within a community a sense of responsibility for planning a well-rounded public health program and for its continuing success. Public health school faculties have pioneered in these changes by modifying methods of teaching and course content and by their personal community services.

In the study year, all 9 schools of public health offered courses in public health education and 7 of them offered a major in this subject

[11] Field training is discussed in somewhat more detail in a later section of this chapter.

(California, Columbia, Harvard, Michigan, Minnesota, North Carolina, Yale). Six schools (California, Columbia, Michigan, Minnesota, North Carolina, Yale) had separate departments of public health education. The other three schools (Harvard, Johns Hopkins, Tulane) each offered a single course given by faculty in the public health administration department.

The techniques of group dynamics are emphasized at some of the schools and small group discussions at all. Field observation and to some extent field investigations are frequently required as part of the regular courses in public health education, and many of the special courses require fieldwork. A period of 3 months of supervised field training is, practically speaking, a requirement for all students specializing in public health education. Most schools arrange the field training for the summer months following the academic year and withhold the degree until the fieldwork is completed. At one school (North Carolina) the spring quarter is given to field training, after which the students return to the school for another academic quarter. The students are usually sent to only those local or State health agencies that have well-trained health educators on their staffs. Faculty of the school of public health visit the field-training centers to confer with the supervising health educators and students so that close integration can be maintained between academic training and practical experience.

Environmental Sanitation.—The increasing scope and complexity of public health problems have led both to addition of courses in environmental sanitation and to change in emphasis. At four schools (Harvard, Johns Hopkins, North Carolina, Yale) the faculty members interviewed thought that these changes had not altered the basic training needs of the students—an understanding of ecology, biochemistry, statistics, and epidemiology now, as always, being essential. At the other schools, however, the expanded curriculum is considered to be a response to changes in the basic concepts of training needs.

Departments of sanitary engineering, sanitary science, environmental health, or environmental sanitation were reported by all the schools of public health. At four schools (California, Harvard, Johns Hopkins, Tulane), few if any engineers were admitted for specialist training in public health engineering; instead, most engineers registered primarily at schools of engineering. Somewhat the reverse situation was reported by one school (North Carolina), however, where the school of public health offers the degree of master of science in sanitary engineering and does not limit registration for this degree to persons concerned with public health. More than a third of the graduate students who were majoring in sanitary engineering or sanitary science at the schools of public health were in this one school. The particular school at which engineers register for graduate study

is determined by the relationship between the school of public health and the school of engineering and by the division of responsibility and facilities. In all schools practically all candidates for the degree of master of public health, regardless of major subject, take at least one course in environmental sanitation.

Summer field-training experience is arranged for some students specializing in environmental sanitation, particularly for students from foreign countries. Much of this experience is acquired at the Communicable Disease Center of the Public Health Service. At all schools, observation field trips are included in the general sanitation courses required for the master of public health degree. Visits to waterworks, sewage plants, and milk pasteurization plants are routine.

Hospital Administration.—Although training in hospital administration in schools of public health is a relatively new development, five schools (California, Columbia, Johns Hopkins, Minnesota, Yale) provided special curriculums in this subject in the study year. Four of them (California, Columbia, Minnesota, Yale), consider the department's function to be that of giving hospital administrators a broad professional background and an awareness of their responsibility for public health. At the other school, although hospital administrators were being trained, the primary function of the department is considered to be the orientation of public health students in hospital administration.

Observation field visits to nearby hospitals are part of the course requirements at all five schools. In at least two of the schools (Minnesota, Yale), the students undertake special studies which involve fieldwork. At three of the schools which give specialist training in hospital administration (Columbia, Minnesota, Yale), a 12-month hospital administration residency following a full academic year's work is required before the degree is awarded. At one other school (Johns Hopkins), a year of residency training is required for nonmedical students before the degree is granted.

The residency training must be taken at hospitals approved by the schools. Perhaps the most important requirement made by the schools before approving a hospital for residency training is that the hospital have an administrator interested in the training program and one who will give time to the students. At one school (Johns Hopkins), where the group of students is small, the residency training is taken in the city where the school is located. The other schools send their students to hospitals in various parts of the country. While the students are taking their residency training, they are visted by the school's hospital administration faculty for supervision and consultation. The hospital preceptors are usually required to send a report to the school on the performance of the students.

Industrial Hygiene.—In recent years, industrial hygiene pro-

grams have changed markedly. From the narrow preoccupation with specific industrial hazards of a few years ago, modern programs encompass the whole range of environmental factors which affect the health of workers as well as the organization of health services for them. Workmen's compensation programs, disability insurance, and collective bargaining agreements have tended to accelerate this trend. These changes are being incorporated in the programs of instruction in this subject in the schools of public health.

All nine schools of public health provided courses in occupational health during the study year. Six schools (California, Columbia, Harvard, Michigan, Tulane, Yale) had organized departments and the other three schools gave one or more courses as part of the teaching of some other department.

Observation field visits are arranged in connection with many of the courses. At one school (California), students specializing in this subject spend the summer following their academic year in fieldwork unless they have had several years of prior experience. Another school (Yale) offers a special-project course which may include field services.

Maternal and Child Health.—The activities of State and local health departments in maternal and child health have increased greatly during the last 15 years, both in number of programs and in scope. As a result, more maternal and child health specialists must be trained and their training must be broadened. Training in mental health, in nutrition, in growth and development, and in the social sciences is now as essential for such specialists as is instruction in the administration of maternal and child health programs.

Eight of the nine schools of public health provided courses in maternal and child health during the study year (all except Yale). Only three of the schools (California, Harvard, Johns Hopkins) had organized departments or divisions. At the other five schools courses in this subject were given in the departments of public health administration or public health nursing.

Maternal and child health courses consist chiefly of work in seminar groups and clinics. At the three schools with organized departments in this subject, fieldwork forms a significant part of the training. At one school (Johns Hopkins), students specializing in maternal and child health spend 12 weeks following the academic year in fieldwork. The services visited during this period include State and local maternal and child health agencies, hospitals, and maternity centers, some of which provide services for home deliveries. A demonstration center is being developed at Johns Hopkins to provide facilities for both teaching and research.

Medical Care Administration and Medical Economics.—With the broadening of public health concepts, the essential interdepend-

ence of health promotion, disease prevention, treatment, and rehabilitation is becoming more widely accepted. Accordingly, schools of public health are establishing programs of research and instruction in the availability and quality of medical care, the principles of organization and administration of medical services, the characteristics of programs in operation, and the socioeconomic factors which determine the need and the organization of services.

In the study year, all schools provided some courses in medical economics or medical care administration, but only three schools (California, Michigan, Yale) had organized departments. In other schools the courses were given in the departments of public health administration.

In some courses the lecture method is used, but the most common type of teaching is the small discussion group. At one school (California), most of the students specializing in medical care administration take a 3-month field-training course. At four schools (California, Harvard, Michigan, Yale) visits to medical care agencies are arranged as part of the regular courses in this subject.

Public Health Nursing.—Instruction in public health nursing, as in other fields, shows the growing recognition by the public health profession of the importance of socioeconomic factors in illness and the increasing importance of chronic diseases. With the development of the concept of the family as the unit of service, and the integration of specialized services into generalized public health nursing, both developments of the past 10–20 years, the requirements for public health nursing have changed and broadened. The public health nurse must understand the total needs of the individual and family, as well as the organization of the community and its institutions.

During 1949–50, four of the schools had departments of public health nursing (Michigan, Minnesota, North Carolina, Yale), and at two others (Harvard, Johns Hopkins) courses in public health nursing were given by public health nurses who were members of the departments of public health administration. One other school (California) had two part-time nurse instructors who assisted in several departments but gave no courses in public health nursing.

The courses in public health nursing usually consist of lectures and discussions. At three schools (Michigan, Minnesota, North Carolina) considerable field training is arranged for the public health nursing students. The nurses taking the special mental health training at one school (Minnesota) spend about half their time in field training. At another school (North Carolina) one of the four quarters of the academic year is so spent. At a third school (Michigan) the undergraduate nurses average about one semester a year in fieldwork and special arrangements are made for the graduate students to get field training in both urban and rural areas.

CANCER CONTROL.—Little special instruction in cancer control was given at the schools of public health during the study year, although there was evidence of developing interest in this subject. Only 2 schools (Harvard, Yale) offered special curriculums in this subject, and only 1 of them had a separately organized department (Yale). An additional school (Michigan) has listed this subject in its catalog as a possible field for specialization. At three schools (California, Columbia, Yale), cancer control was one of the subjects covered in a general survey or core course. The time devoted to such teaching in these courses ranged from 1 to 4 hours.

At both schools where a significant amount of instruction in cancer control is given, Public Health Service grants were instrumental in starting these programs. Observation of operating programs was an important part of the training at one of these schools and of somewhat lesser prominence at the other. State and local cancer control programs, cancer hospitals, clinics, and detection centers were the agencies used for this purpose.

PUBLIC HEALTH DENTISTRY.—Four of the nine schools of public health provided some courses in public health dentistry during 1949–50 (California, Harvard, Michigan, Minnesota). Only one school (Michigan) had an organized department. The catalog of another school (Columbia) lists 12 courses in the dental aspects of public health, but apparently none of them was actually given during 1949–50, and no full-time faculty was reported for the subject. At the school in California, instruction was provided by a part-time professor who was also chief of the division of dental health of the State health department. At Harvard, the courses were given by faculty from the school of dental medicine. At the Michigan school of public health, the department is headed by a professor of public health dentistry who is also professor of dentistry in the school of dentistry. At the school of public health in Minnesota, a dentist from the State health department gave the one course offered.

In the one organized department of public health dentistry (Michigan), the program has been developed as a formal training experience for dentists who expect to direct a State bureau of public health dentistry or participate in a similar supervisory or administrative capacity.[12] To achieve this purpose, the curriculum is designed to give the dentist sufficient background in public health to relate his specialized program to the total public health program.

Arrangements for special field training in the form of clinic experience or observation of public health dental programs are made at Harvard and Michigan.

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[12] School of Public Health Announcement; Professional Education of Public Health Personnel, 1949–50, University of Michigan Official Publication, p. 30.

MENTAL HYGIENE.—In 1949–50, eight of the schools of public health provided some courses in mental health, and three (Harvard, Johns Hopkins, Minnesota) offered sufficient work to permit students to major in this subject. At the other five schools, most of the graduate students took all the courses offered, either as part of the required core courses or as electives.

At one of the schools which offers specialist training in mental health (Harvard), the teaching is closely integrated with a community research-service project, administered by the same staff. At another school (Minnesota), the mental health course is designed to train public health nurses in psychiatric nursing and requires six quarters of study, half of which is fieldwork. Most of the academic instruction is given by schools or departments of the university other than the school of public health itself.

Only one school (Johns Hopkins) had an organized division of mental hygiene in the study year. Both physicians and nurses were accepted for special training in mental hygiene. Psychiatrists wishing to obtain a public health background could register for the master of public health degree and take special work in mental hygiene. This program of study requires fieldwork during the summer following the regular academic year.

VENEREAL DISEASE CONTROL.—All schools provided some teaching of venereal disease control in 1949–50, although at one school (Yale) this subject apparently was covered only in general courses in public health practice. Three schools (Johns Hopkins, North Carolina, Tulane) gave departmental status to venereal disease control. At the other schools, one or more specific venereal disease courses were given, in either the departments of epidemiology or public health practice. At the schools with separate departments of venereal disease control, the training of physician specialists seemed to be emphasized. Most of the schools offered courses in venereal disease control for public health nurses or for health educators. At one school (North Carolina), basic experimental work was a major function of the department.

Clinic work supplements the lectures and discussion group instruction in venereal disease control. Work in clinics forms an important part of the training of venereal disease specialists. At one school (Tulane) all courses in this subject make use of the Rapid Treatment Center. At another school (Harvard), students specializing in this field are expected to spend considerable time and to participate in the work of the clinics of an affiliated hospital. At a third school (Johns Hopkins), the students taking specialist training spend half their time during the academic year in clinic work and in addition are required to put in full time in the clinics during the summer preceding their academic instruction.

Other Fields

Virtually all courses given in the schools of public health fall into one of the areas described above. Nevertheless, the range of specialized courses available to students of schools of public health is limited only by the resources of the universities. It would, therefore, not be feasible to attempt to include discussions of all courses taken by students of public health.

Supervised Practice

The value of supplementing academic instruction with supervised experience both in clinics and in operating public health programs is recognized by all the schools of public health. Clinical training in hospital outpatient departments and health centers is receiving increased emphasis at the schools of public health, and clinical faculty of the medical schools seem to show more interest than formerly in public health activities and training. Orientation of public health training towards problems of adult health, chronic illness, and mental health requires active use of clinical resources and close affiliation with medical schools.

At least five of the schools of public health (California, Harvard, Johns Hopkins, Tulane, Yale), have specific provisions for clinical work in connection with certain of the subjects taught—maternal and child health, cancer control, industrial health, mental health, venereal disease control, and tuberculosis control. In some instances, specific clinical courses are offered during the regular academic year, while in at least one school (Johns Hopkins) physicians wishing to specialize in mental hygiene or venereal disease control spend 3 months before or after the academic year exclusively in clinical training. Some of the clinical work available to students of schools of public health is provided in facilities of the university hospital or medical school and some in affiliated or associated institutions and agencies. In a few instances (such as the Rutland Street Center of Johns Hopkins), the school of public health itself maintains certain clinical services which afford training opportunities for public health students.

In 1947, the Committee on Professional Education of the American Public Health Association (*15*) said: "The proper training of public health personnel requires not only formal academic training but also the opportunity to study the field application of the principles learned in the classroom. Field observation and study are to public health education what the student laboratory and internship are to medical education."

Most of the fieldwork correlated with the teaching program of the schools of public health has been developed for students at the graduate level majoring in applied fields of public health and not for those majoring in the basic sciences. Field experience may be re-

quired before enrollment at a school of public health, during the academic year, or after completion of the academic year. Each school varies the requirements to some extent to take account of the student's background or major interest. The field training offered includes observation, field investigation, supervised field experience, and residency training.

The most frequent type of fieldwork done during the school year consists of observation only. Observation visits may be occasional—to see some special health activity or program in operation—or they may be scheduled at frequent and regular intervals to enable the student to keep in close touch with the work of a local health department or other health service. The size of the group making observation visits varies. According to the deans, the most satisfactory type gives students close and individual contact with an expert who is actually doing his job. For example, one school (Columbia) has sent students individually once a week for 8 successive weeks to spend a day with a member of the city health department staff to observe his way of performing his regular duties. These individualized observation visits have been so successful that the school is eager to develop more opportunities of this kind.

Various kinds of surveys carried on by students under the supervision of the schools' faculties have provided useful practical experience for the students. Yale has conducted a series of surveys of local health areas which not only have been of service to the local communities but also have afforded students an opportunity for active and critical investigation of health problems. Harvard is developing similar surveys for the same purpose. At the school in California, the students, as part of the work of the public health practice course which all must take, are divided into groups representative of the different public health professions. Under the supervision of a member of the faculty each of these groups surveys a local health department, making use of a revised version of the American Public Health Association's evaluation schedule. The Michigan school uses a somewhat similar plan as part of a required course in public health practice—several teams of students, each comprising representatives of the various professional interests of the staff of a county health department, form a "campus health department" for a given local area. Each team spends a week in its local area to study firsthand the work of the health department, presents a report and evaluation of the health department's work to the whole class, and follows the health department's activities throughout the academic year.

Supervised field training is widely used in public health nursing and in public health education. At the school in North Carolina, for example, the students who major in public health nursing or in public health education spend one-quarter of the school year in a

local health agency to observe and participate in the regular activities of the local agency. Arrangements for this field experience are made with health agencies throughout the United States. Faculty of the school provides some supervision of the students, and small payments are made to the individuals in the local health departments who give the students continued supervision.

Residency training has been defined by the American Public Health Association as an extended period of active service under supervision following a period of formal academic training in public health (*15*). During the period covered by this study, hospital administration was the only field in which residency training was used. At three schools (Columbia, Minnesota, Yale), a degree in hospital administration is conferred only after a 12-month hospital administration residency following the academic year of instruction at the school.

The American Public Health Association's longstanding interest in the quality of field training has resulted in the establishment of standards and a plan for accreditation. Under a tripartite agreement, the American Public Health Association, the American Board of Preventive Medicine, and the Council on Medical Education and Hospitals of the American Medical Association have developed field-training areas that have been accredited for residency training of physicians qualifying for certification as public health specialists. The American Public Health Association through its Consultant on Accreditation of Field Training Areas, Dr. Haven Emerson, has undertaken the responsibility for visiting and evaluating training areas (*16*). By the fall of 1952, some 80 local areas in 12 States had been approved for physician residencies in public health (*17*).

CHAPTER III. School Facilities, Staff, and Students

Facilities

AT THE time of this study most schools of public health had outgrown their physical facilities. The deans of seven of the schools considered their physical plants inadequate for graduate work of high professional caliber. Even at the other two schools, additional space would be needed if the enrollment were greatly increased or if the teaching and research programs were markedly expanded. Two schools were using temporary buildings which were not designed for teaching and research. Several schools were using space in two or more buildings, sometimes scattered over a large campus. The schools' need for space is reported in more detail in chapter V.

The deans considered the library facilities available to the students of the schools of public health to be excellent. At three schools, however, reading-room space was not adequate. Most of the schools depend mainly on library facilities shared with the medical school. At two schools (California, Michigan), the library housed in the public health school is operated as a part of the university library system.

Clinical facilities are used for classwork in such subjects as: maternal and child health, venereal disease control, tuberculosis control, cancer control, mental hygiene, tropical public health, and industrial hygiene. Health department and hospital clinics furnish most of the facilities used by schools of public health, although a few schools had some administrative responsibility for the operation and maintenance of clinics.

Most of the deans reported some gaps in the clinical facilities available for public health students. At one school (Yale), such facilities were reported as exceptionally good. At Columbia, Harvard, and Tulane, they were considered adequate. One school (North Carolina), at the time of this study, needed better facilities for the maternal and child health program but would have adequate facilities when a university hospital is in operation. The Michigan school needed better clinical facilities for the work in child health and the Minnesota school, for the work in venereal disease. At Johns Hopkins, the clinical facilities were considered adequate for venereal disease and maternal and child health but not for tuberculosis or mental hygiene. At the California school, the clinical facilities were reported to be "fairly good," but their geographic separation from the school made their use inconvenient. The deans reported a tendency for the schools

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of public health to move into closer relationships with the medical schools, partly to obtain better clinical facilities.

Facilities for fieldwork provide supervised practical experience in various phases of public health practice and administration as a supplement to academic classroom teaching. Sometimes the students visit these field-training facilities for observation only, but the schools are making increasing efforts to arrange opportunities for student participation in actual operating programs. The kind of facilities used, their location, and the extent to which they are used depend to some degree on the specific purpose for which the field-training experience is planned.

At one school (Harvard), where a large part of the fieldwork is concentrated into two 1-week periods between school terms, the field facilities used vary from year to year depending on the needs of the students; no formal relationships or administrative agreements are established between the school and the facilities visited. At another school (Johns Hopkins), the same facilities are used for field training each year. They consist of three county health departments in Maryland and the Baltimore City Eastern Health District which is adjacent to the school. The health officers of the three counties hold staff appointments at the school, and the salary of the director of the Eastern Health District is paid jointly by the city health department and the school. The health district is also used by the school staff and students for a continuing series of research projects.

All the schools use county or city health departments to some extent for field training. Where the students use such facilities merely for occasional observation of public health activities, the schools make no payments to the health departments. Where students spend considerable time at a local health department and perhaps participate in the actual operation of the programs, the schools may, in some instances, make a payment to the health department as partial compensation for the demand on staff time. Some of the health department personnel who have responsibility for supervising the fieldwork of students hold faculty appointments at the schools.

At least two of the schools (California, Tulane) hope to set up health districts that will have some administrative ties with the school. The dean of the California school said he would like to develop a district in Oakland or Berkeley that would be available for teaching and for research. Such a district might be administered by an assistant health officer who would also be a member of the school faculty. At Tulane the dean of the medical school reported that he was negotiating with the New Orleans city health department for the establishment of a health district to be used as a special training and research area. It may not be possible to make the necessary arrangements in the near future but the faculty of the school hopes to develop such a district.

Staff

A wide range in subjects taught, relatively small numbers of graduate students, and active programs of research and community service characterize the schools of public health. Because of the variation in backgrounds, needs, and long-range objectives of the students, individual and small-group teaching distinguishes much of the instruction. These characteristics of the teaching in schools of public health result in faculties that seem large in comparison with the number of students.

Information on the professional and technical staffs of the schools of public health was obtained for this study from the deans of the schools and from individual staff members. The latter source is the basis of the analysis presented here.[1] Individual schedules were received from 586 staff members, 484 classified as professional (that is, faculty) and 102 as technical staff. Clerical and custodial personnel were not included.

Status

Each staff member reported his employment status in one of three classes:

Status A, full-time employment in the school of public health;
Status B, full-time employment in the university, giving part time to the school of public health;
Status C, part-time employment in the school of public health with main employment outside the university.

Table 3 gives, for each school, the numbers of staff members in these three status groups. Among the 484 faculty members, the 232 in the Status A group constitute the core of the teaching and research faculty. An additional 106 faculty members (Status B) had full-time employment in the university but did not devote full time to the school of public health. Some of these persons held joint appointments in the school of public health and some other division of the university, while others held their appointment in another division of the university.

The group of 146 part-time persons (Status C) was responsible for planning and teaching one or more courses at the schools of public health.[2] Status C persons, in addition to their posts at the schools of public health, usually held positions in other organizations—State

[1] Judging by data received from the schools' administrators and financial officers, this sample probably represents at least 90 percent of the staff of the schools. Since the sample may be less complete for some of the individual schools, the findings should be interpreted with this limitation in mind.

[2] The lecturers included in the counts of faculty are only those who have responsibility for organizing or teaching one or more courses. All schools supplement their teaching by using special, invited speakers who were not counted as staff in this study.

or local health departments, hospitals, voluntary organizations, or teaching or research institutions other than the school's parent university. The extent to which Status C persons were used varied widely.

Table 3. Employment status of professional and technical staff at each of 9 schools of public health—1949–50 [1]

School	Total professional and technical staff	Professional staff				Technical staff		
		Total	Status A [2]	Status B [3]	Status C [4]	Total	Status A [2]	Status B [3] and C [4]
Nine schools	580	484	232	106	146	102	92	10
California	75	75	28	15	32	------	------	------
Columbia	52	47	19	3	25	5	5	------
Harvard	128	94	50	13	31	34	33	1
Johns Hopkins	108	75	37	23	15	33	28	5
Michigan	69	59	26	18	15	10	10	------
Minnesota	30	31	20	8	3	8	4	4
North Carolina	47	39	31	6	2	8	8	------
Tulane	44	40	14	10	16	4	4	------
Yale	24	24	7	10	7	------	------	------

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.

Seven of the nine schools employed technical staff members totaling 102 persons, of whom 90 percent were full-time employees of the schools of public health, that is, Status A.

Differences in the amount and character of research being carried on, in numbers and types of students, in school organization, and in subjects taught are some of the factors that account for the variation in numbers of personnel reported from individual schools.

Academic Title

Many different faculty titles were reported. For the purpose of analysis they were classified under the following four categories:

1. Professors and associate professors;
2. Lecturers;
3. Assistant professors, associates, research associates, and instructors;
4. Assistants, research assistants, and research fellows.

Grouped on this basis, 33 percent of the professional staff were in the first category (senior faculty), 20 percent were lecturers, 37 percent were in the third category, and 10 percent in the last group.[5]

The American Public Health Association's criteria for accreditation of the master of public health and doctor of public health degrees

[5] "Occasional" lecturers are not included. See definition of part-time faculty.

include the requirement of at least eight faculty members of professorial or associate professorial grade giving full time to the university [4] and carrying specific major responsibilities for teaching or research in the school. (See appendix A for the criteria for accreditation.) The 9 schools had a total of 143 senior faculty in this group, ranging from 8 at 1 school (Columbia) to 23 at another (Johns Hopkins). An additional 16 part-time (Status C) senior faculty supplemented the full-time group.

In the group of assistant professors, associates, research associates, and instructors (totaling 182 individuals), 52 percent were of Status A and 20 percent, Status B. The group of assistants, research assistants, and research fellows (48 in number) had 48 percent of Status A and 25 percent of Status B. Of the 95 lecturers, 13 percent were of Status A and 18 percent of Status B. For all groups, considerable variation from school to school appeared in the proportions of Status A and B individuals. (See appendix B, table 1, for details.)

Departmental Affiliation

A distribution of staff according to field of instruction gives some approximate measure of the relative emphasis accorded to the several elements in the schools' educational programs. To make this distribution, the department classification developed for this report (see ch. II) was used, and staff members were distributed among these departments according to data provided by them. The results of this allocation of professional and technical staff for each school appear in table 4. Even though it is not precise such a distribution provides a useful picture of a school's instructional activities. Where the table shows, for a particular school, no staff in a given department the subject may, nevertheless, be taught at that school but in some other department. For example, three schools reported no staff for departments of epidemiology. This finding does not mean a lack of epidemiologists or of instruction in epidemiology but indicates merely that epidemiology was not organized as a separate department in those schools.

Only 3 departments had staff reported from all 9 schools. They were: public health administration or practice, biostatistics, and environmental sanitation. Eight schools had staff in the departments of nutrition, and six had staff in departments of epidemiology, tropical public health, industrial hygiene, and public health education. Five schools had departments of hospital administration and of public health nursing. The largest number of staff, totaling 86 professional and 2 technical personnel, was reported for departments of public

[4] That is, Status A or B as used in this report.

Table 4. Departmental or divisional affiliation of professional and technical staff at each of 9 schools of public health—1949–50 [1]

Department or division	Nine schools		California		Columbia		Harvard		Johns Hopkins		Michigan		Minnesota		North Carolina		Tulane		Yale	
	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical	Professional	Technical
All departments or divisions	484	102	75	------	47	5	94	34	75	33	59	10	31	8	39	8	40	4	24	------
Public health administration [2]	86	2	6	------	7	------	25	2	8	------	16	------	4	------	8	------	8	------	4	------
Biostatistics	32	13	5	------	3	------	4	1	8	5	4	1	4	5	1	------	2	1	1	------
Public health education	16	------	3	------	3	------	------	------	------	------	3	------	1	------	4	------	------	------	2	------
Environmental sanitation [3]	34	4	7	------	4	1	4	------	2	------	5	------	3	3	3	------	1	------	3	------
Epidemiology	52	14	12	------	7	------	7	2	8	5	16	7	------	------	------	------	2	------	------	------
Hospital administration	22	------	3	------	10	------	------	------	5	------	------	------	1	------	------	------	------	------	3	------
Industrial hygiene	31	4	3	------	6	1	14	3	------	------	4	------	------	------	------	------	2	------	2	------
Maternal and child health	21	2	5	------	------	------	12	2	4	------	------	------	------	------	------	------	------	------	------	------
Medical economics [4]	7	1	4	------	------	------	------	------	------	------	2	1	------	------	------	------	------	------	1	------
Microbiology [5]	22	12	9	------	------	------	4	4	9	8	------	------	------	------	------	------	------	------	------	------
Public health nursing	17	------	2	------	------	------	------	------	------	------	6	------	5	------	2	------	------	------	2	------
Nutrition [6]	29	18	1	------	2	------	11	11	9	5	1	------	------	------	3	2	1	------	1	------
Physiological hygiene	22	10	------	------	------	------	6	4	8	6	------	------	7	------	------	------	------	------	1	------
Tropical public health [7]	38	16	------	------	4	3	7	5	8	4	1	1	------	------	5	------	13	3	------	------
All other [8]	55	6	15	------	1	------	------	------	6	------	1	------	4	------	13	6	11	------	4	------

[1] Data from individual staff schedules received.
[2] Includes public health practice and field training.
[3] Includes public health engineering, sanitary engineering, sanitary science.
[4] Includes medical care administration.
[5] Includes bacteriology, public health laboratory.
[6] Includes biochemistry.
[7] Includes parasitology.
[8] Includes cancer control, public health dentistry, experimental medicine, mental hygiene, personal health, tuberculosis, venereal disease control, courses given by persons from other divisions of the university who have no departmental affiliation in the school of public health, and undergraduate instruction.

health administration. Epidemiology departments had the next largest number of staff—52 professional and 14 technical. The largest numbers of technical staff were reported for departments which were carrying on laboratory research or in which laboratory work is an essential part of instruction.

More than three-fourths of the staffs of the departments of medical economics and of biostatistics consisted of full-time employees of the schools of public health (that is, Status A), while less than one-fourth of the staffs in hospital administration or in public health administration were in Status A. Half or more of the staffs in these latter two departments were in Status C category (table 5).

Table 5. Employment status of professional staff affiliated with different departments or divisions at 9 schools of public health—1949–50 [1]

Department or division	Total	Status A [2]	Status B [3]	Status C [4]
	Number			
All departments or divisions	484	232	106	146
Public health administration [5]	86	18	21	47
Biostatistics	32	25	3	4
Public health education	16	10	5	1
Environmental sanitation [6]	34	19	9	6
Epidemiology	52	21	9	22
Hospital administration	23	6	6	11
Industrial hygiene	31	16	5	11
Maternal and child health	21	15	2	4
Medical economics [7]	7	6		1
Microbiology [8]	22	14	5	3
Public health nursing	17	9	4	4
Nutrition [9]	20	18	6	5
Physiological hygiene	22	10	8	4
Tropical public health [10]	38	26	5	7
All other [11]	55	21	18	16
	Percentage distribution			
All departments or divisions	100.0	47.9	21.9	30.2
Public health administration [5]	100.0	20.9	24.4	54.7
Biostatistics	100.0	78.1	9.4	12.5
Public health education	100.0	62.5	31.3	6.2
Environmental sanitation [6]	100.0	55.9	26.5	17.6
Epidemiology	100.0	40.4	17.3	42.3
Hospital administration	100.0	22.7	27.3	50.0
Industrial hygiene	100.0	48.4	16.1	35.5
Maternal and child health	100.0	71.4	9.5	19.1
Medical economics [7]	100.0	85.7	0	14.3
Microbiology [8]	100.0	63.7	22.7	13.6
Public health nursing	100.0	53.0	23.5	23.5
Nutrition [9]	100.0	92.1	30.7	17.2
Physiological hygiene	100.0	45.4	36.4	18.2
Tropical public health [10]	100.0	68.4	13.2	18.4
All other [11]	100.0	38.2	32.7	29.1

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to the school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.
[5] Includes public health practice and field training.
[6] Includes public health engineering, sanitary engineering, sanitary science.
[7] Includes medical care administration.
[8] Includes bacteriology, public health laboratory.
[9] Includes biochemistry.
[10] Includes parasitology.
[11] Includes cancer control, public health dentistry, experimental medicine, mental hygiene, personal health, tuberculosis, venereal disease control, courses given by persons from other divisions of the university who have no departmental affiliation in the school of public health, and undergraduate instruction.

Academic Qualifications of Faculty Members

More than two-thirds of the faculty members of the nine schools of public health held academic degrees more advanced than the bachelor's degree. Of the 484 professional staff, 117 had public health degrees—32 doctor of public health and 85 master of public health degrees. An additional 111 held doctor of philosophy or doctor of science degrees and 106 had masters' degrees other than the master of public health. Table 6 shows the degrees held by the faculty in each of the three employment status groups.

Table 6. Academic degrees of professional staff in each employment status at 9 schools of public health—1949–50 [1]

Academic degree	Total	Status A [2]	Status B [3]	Status C [4]
	Number			
All degrees	484	232	106	146
Doctor of public health	32	18	5	9
Master of public health	85	35	10	40
Doctor of philosophy or science	111	74	23	14
Other masters' degrees	106	48	29	29
Bachelors' degrees	114	45	27	42
Other degrees	2		1	1
Degrees not reported	34	12	11	11
	Percentage distribution			
All degrees	100.0	100.0	100.0	100.0
Doctor of public health	6.6	7.7	4.7	6.2
Master of public health	17.6	15.1	9.4	27.4
Doctor of philosophy or science	22.9	31.9	21.7	9.6
Other masters' degrees	21.9	20.7	27.4	19.8
Bachelors' degrees	23.6	19.4	25.5	28.8
Other degrees	.4	0.	.9	.7
Degrees not reported	7.0	5.2	10.4	7.5

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to the school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.

Table 7. Professional field of faculty in each employment status at 9 schools of public health—1949–50 [1]

Professional field	All faculty	Status A [2]	Status B [3]	Status C [4]
Total	484	232	106	146
Identifiable by professional degree	281	112	59	110
Physicians	208	78	41	89
Engineers	38	18	11	9
Nurses	20	15	5	0
Dentists	4		1	3
Veterinarians	2	1	1	
Not identifiable by professional degree	203	120	47	36

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to the school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.

More than half of the faculty were identified with a profession by a degree other than or in addition to one in public health. Physicians were by far the most numerous of the groups which could be so identified. Table 7 shows the number identifiable by professional degree and the distribution of these faculty members by full-time and part-time employment.

Of the 208 physicians, 88 also held public health degrees (26 were doctors and 62 were masters of public health). Public health degrees were held by 4 of the 38 engineers and by 6 of the 29 nurses (appendix B, table 2).

Age Distribution of Faculty Members

During 1949–50, the faculty of the nine schools of public health ranged in age from 21 to 72 years, with an average of 42 years. The three employment status groups differed but little in average age, although the average age of part-time faculty members (Status C) was slightly greater than that of the other two groups (table 8).

Table 8. Age distribution of faculty in each employment status at 9 schools of public health—1949–50 [1]

Age group	Total	Status A [2]	Status B [3]	Status C [4]
All ages	484	232	106	146
20-24	17	12	4	1
25-29	33	18	8	7
30-34	71	40	13	18
35-39	94	48	21	25
40-44	92	35	21	36
45-49	75	40	12	23
50-54	36	11	13	12
55-59	40	19	9	12
60-64	20	7	4	9
65 and over	6	2	1	3
Average age	42	41	42	44

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to the school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.

In most institutions of higher learning, academic rank is highly correlated with age, since top faculty positions are usually held by those with many years of academic experience. Schools of public health are no exception. The average age of the faculty of the schools of public health in the four academic title groups used in this study was as follows:

Group	*Average age*
Professors and associate professors	48
Lecturers	46
Assistant professors, associates, research associates, instructors	38
Assistants, research assistants, research fellows	32

A study of dental schools (*18*, table 4) covering the same academic year as this study of the schools of public health shows that the average age of dental school faculty was 40 years—2 years younger than the average age of public health school faculty (appendix B, table 3).

Distribution of Staff Time

To obtain some estimate of the relative amount of faculty time spent on each of the major functions of schools of public health and on other activities, each staff member was asked to estimate the percentage of his time spent in teaching, research, community services or activities, administration, and other responsibilities. No attempt was made to give precise definition to these functions. Each faculty member classified his activities according to his own interpretation of his duties.

Analysis of these estimates indicates that for all 9 schools combined, the "A" group of faculty spent 97 percent of their time on duties directly connected with the functions of the schools of public health and the remaining 3 percent on other university duties, such as teaching medical school students. The "B" faculty gave 42 percent of their time to the schools of public health and 58 percent to other university duties. The "C" group of professional staff spent 16 percent of their time in the schools of public health, gave 4 percent to other university duties, and spent 80 percent in work outside the university.

Because of these differences in proportion of time devoted to the schools of public health, the actual numbers of faculty in the three status groups do not give an accurate picture of the significance of each group in the school program. One frequently used device to improve comparability is to convert the numbers of faculty to "full-time equivalents." Thus, the 97 percent of their time which the 232 "A" faculty gave to the schools of public health would be the equivalent of 224 persons giving their entire time to the schools. The 42 percent which the 106 "B" faculty spent on the schools' functions would be the equivalent of 45 persons giving all their time to these same functions. The "C" faculty would be reduced from 146 persons giving 16 percent of their time to the schools to 24 full-time equivalents. On this basis, the total faculty of 484 persons would be the equivalent of 293 persons spending all their time in teaching, research, community service, or administration for the schools of public health (table 9).

Of the faculty time given to teaching, research, community service, and administration for the school, 42 percent was spent in teaching,

40 percent in research, 8 percent in community services or activities, and 10 percent in administration. The full-time faculty (Status A) carried the major share of these functions—accounting for 70 percent of the teaching time, 82 percent of the time given to research, 72 percent of that spent on community services, and 86 percent of the time spent on administration. Characteristically, services of members of the part-time faculty are mainly given to teaching. More than 60 percent of the time of part-time faculty (Status C) was spent in teaching, a proportion higher than that for either of the other groups. Nevertheless, the aggregate teaching time spent by part-time faculty constituted only 12 percent of the total amount of teaching time in all schools combined.

Table 9. Full-time equivalent of faculty in each employment status at 9 schools of public health—1949–50 [1]

Function in school of public health	Total	Status A [2]	Status B [3]	Status C [4]
	Full-time equivalent			
All functions	293	224	45	24
Teaching	123	86	22	15
Research	117	90	13	8
Administration	28	24	3	1
Community service	25	18	7	.....
	Percentage distribution			
All functions	100.0	100.0	100.0	100.0
Teaching	42.0	38.4	48.9	62.5
Research	40.0	42.0	28.9	33.3
Administration	9.5	10.7	6.7	4.2
Community service	8.5	8.0	15.5	0
	Percentage distribution			
All functions	100.0	76.4	15.4	8.2
Teaching	100.0	69.9	17.9	12.2
Research	100.0	82.1	11.1	6.8
Administration	100.0	85.7	10.7	3.6
Community service	100.0	72.0	28.0	0

[1] Data from individual staff schedules received.
[2] Full-time employment in the school of public health.
[3] Full-time employment in the university, giving part time to school of public health.
[4] Part-time employment in the school of public health with main employment outside the university.

A recent study (*19*) of medical school faculties shows that 55 percent of faculty time was spent in teaching and clinical service, 32 percent in research, and 13 percent in administration. Total faculty time as used in that study was measured in terms of full-time equivalents. Although the full-time equivalents were determined by a method somewhat different from that used for the public health schools, the distribution of faculty time according to function is very similar for

the two kinds of schools. The following tabulation is a summary of findings in schools of public health and medical schools:

Faculty functions	Percent of faculty time: Schools of public health 1949–50	Medical schools 1951
All functions	100	100
Teaching	[1] 50	55
Research	40	32
Administration	10	13

[1] Includes 8 percent spent in community service.

The higher percentage of time devoted to research in schools of public health than in medical schools may be attributed, in part at least, to the relatively large proportion of full-time faculty in the schools of public health—48 percent for schools of public health and 25–30 percent for medical schools (*19*, *20* appendix table 12). Since full-time faculty members are in a better position than others to participate in research, which often demands continuing attention, the volume of research activity is usually proportional to the number of full-time faculty.

Students

The schools of public health provide instruction to three groups of students—graduate, undergraduate, and special students. The graduate and undergraduate students are degree candidates. The special students include some individuals who are not taking the full graduate program, but who have training or research backgrounds comparable to those of the graduate students, as well as students who do not fully meet the schools' requirements for degree candidacy, and still others who are working for special certificates.

During 1949–50, all the schools had graduate students, 4 had undergraduate students, and all admitted special students. Reports from the deans of the schools and from the students enrolled were the sources of information on which the following analysis is based. Information was also obtained from eight of the schools on the present location and position of their alumni.

The Student Body in 1949–50

For several reasons counts of students derived from various sources do not agree exactly. One is that the counts may refer to different dates; or the counts may include only students who are degree candidates, excluding special students. Moreover, students who are technically enrolled in some other graduate school of the university and

take nearly all their work at the school of public health sometimes are included in the enrollment count of the school of public health and sometimes are not. Similarly, students who are in the field getting required practical experience may or may not be included in counts of students.[5] The reports on numbers of students submitted for this study vary for similar reasons. In some instances, the numbers of students reported by the schools exceeded the number of schedules received from the students and in other instances, the reverse was true.

In an effort to determine the enrollment of the nine schools of public health a "best estimate" has been based on the data collected from the deans and the students. In general, the larger number reported for a given school was used. For the 9 schools the total enrollment estimated in this manner was 1,239. Compared with this figure it appears that the individual student schedules represented a sample of about 90 percent. The sample seems to be more nearly complete

Table 10. Number of graduate, undergraduate, and special students enrolled at each of 9 schools of public health—1949–50

School	Total	Graduate	Undergraduate	Special
	Estimated number			
Nine schools	1,239	678	395	166
California	240	73	145	22
Columbia	147	110	----	37
Harvard	90	61	----	29
Johns Hopkins	133	113	----	20
Michigan	180	82	76	22
Minnesota	208	101	103	4
North Carolina	115	77	11	27
Tulane	14	13	----	1
Yale	52	48	----	4
	Number of schedules received			
Nine schools	1,007	631	330	130
California	232	73	137	22
Columbia	123	105	----	18
Harvard	86	60	----	26
Johns Hopkins	123	104	----	19
Michigan	151	78	59	14
Minnesota	210	83	129	4
North Carolina	111	77	11	23
Tulane	13	13	----	----
Yale	42	38	----	4

[5] There is no central source of information on enrollment in schools of public health alone. The Committee on Professional Education of the American Public Health Association annually publishes data on the number of graduate students enrolled in graduate public health courses and the number who receive graduate public health degrees (21). Students taking public health courses in schools other than schools of public health are included, however. Additional tabulations showing data by individual universities are made available by the Committee, but for the universities which have schools of public health it is not clear whether the figures given are for the school of public health only or include public health courses given in some other divisions of the university.

for graduate students than for undergraduate or special students. The numbers of graduate, undergraduate, and special students based on the estimates and on the schedules received are shown in table 10.

A total of 1,097 students completed schedules, giving information on age, sex, residence, previous education and employment, major interest at the school, and financial assistance received while at the school. Information on the characteristics of the student body presented in this chapter is based on data provided by the students.

Sex and Age Distribution of Students

Approximately 60 percent of the students enrolled in the schools of public health during 1949–50 were men. Men represented a higher proportion of the graduate students—nearly 75 percent. Nearly three-fourths of the undergraduate students, on the other hand, were women, largely because most of the undergraduate work given was in public health nursing. The special students were somewhat more evenly divided, 55 percent men and 45 percent women. (See appendix B, table 4, for details on sex distribution and marital status.)

The average age for all students combined was 32 years, with no difference in the average age of men and women (table 11). The graduate students ranged in age from 20 to 57 years, with an average age of 34 years. The undergraduate students were, on the average, 6 years younger than the graduate students, having an average age of 28 years. The special students showed the highest average age—35 years.

Table 11. Average age of students enrolled at 9 schools of public health—1949–50 [1]

Type of student	Both sexes	Male	Female
All students	32	32	32
Graduate	34	33	36
Undergraduate	28	26	28
Special	35	37	33

[1] Data from individual student schedules received.

Residence

During 1949–50, students enrolled in the nine schools of public health came from 51 States, Territories, and possessions of the United States and from 39 foreign countries.

Graduate students from the United States, except for those at one school (California), tended to be residents of States other than the one in which the school is located (appendix B, tables 5 and 6). In contrast, undergraduate students tended to be residents of the State

Table 12. Residence of students enrolled at 9 schools of public health—1949–50 [1]

Type of student	Percentage of students from—				
	All countries	Foreign countries	United States		
			Total	Same State	Other State
All students	100	13	87	43	44
Graduate	100	17	83	32	51
Undergraduate	100	1	99	65	34
Special	100	25	75	39	36

[1] Data from individual student schedules received.

More than two-fifths of the foreign students were from Asia—with more students from the Philippine Islands than from any other country. The training of Filipinos was part of a 4-year program, administered by the Bureau of State Services of the Public Health Service, to restore public health services in the Philippines. A fourth of the foreign students came from Central and South America (table 13). The highest proportion of foreign students was found in the group of special students, in part at least, because of the usual policy of admitting foreigners as special students and transferring them to the graduate group only when they have proved their ability to meet the requirements for degree candidates.

Table 13. Residence of foreign students enrolled at 9 schools of public health—1949–50 [1]

Region and country	Total students	Region and country	Total students
30 foreign countries	140	Central and South America—Con.	
		All other	9
Asia	62	Europe	20
Philippines	22		
Siam	10	Germany	4
China	9	Greece	4
India	4	Norway	4
Pakistan	4	All other	8
Iran	3		
Japan	3	Canada	13
Lebanon	3		
All other	4	Africa	7
Central and South America	37	West Indies	6
Chile	8	Haiti	4
Peru	7	All other	2
Brazil	6		
Venezuela	4	Oceania	1
Colombia	3		

[1] Data from individual student schedules received.

Foreign students are often handicapped by language difficulties and in some instances increase the problems of administration and teaching. One dean indicated that although the foreign students

constituted about a fifth of his school's enrollment nearly half the administrative time of the senior faculty was devoted to them. Measured by American standards, many of the foreign students are not adequately prepared for graduate work in public health. Some of them have not been properly informed about the kind of training they will receive, expecting more work in clinics and hospitals than the schools provide. In some instances, moreover, the stipends allowed by the sponsoring agencies are not adequate to maintain a decent standard of living and thus create additional problems in adjustment to a new environment. Two deans mentioned the difficulty of relating the teaching to the specific public health problems of the individual countries represented by the foreign students.

In spite of these difficulties, none of the deans felt that foreign students should be barred. They considered that the advantages of having foreign students at a school were great enough to outweigh any attendant disadvantages or problems. Foreign students, because they have firsthand knowledge of public health practice in other countries, can assist the faculty in explaining the problems of their countries to the other students. With the increasing importance of international health activities this service is a real benefit to the schools. Moreover, the training of foreign students gives the schools an opportunity to contribute toward international health activities and understanding (*22*).

Previous Training

Students enter schools of public health with a wide variety of public health careers in mind and must meet admission requirements that vary to some extent with the courses chosen. Great differences in the amount and kind of preadmission training are therefore to be expected. Most of the undergraduate students have had only 2 years of college work, although the undergraduate nurses have diplomas from schools of nursing. In contrast, more than 50 percent of the graduate students (a total of 331) had professional degrees—204 in medicine, 65 in nursing, 39 in engineering, 14 in dentistry, and 9 in veterinary science. An additional 9 percent had masters' degrees. More than half of the special students (70) also had professional degrees (30 physicians, 34 nurses, 3 engineers, and 3 dentists) and an additional 6 percent had previous graduate degrees. At the other extreme, some special students reported no academic degree received before enrolling in the schools of public health.

Nearly half of the graduate students had received an academic degree within the 5 years preceding the study. The fact that half of the graduate students had been out of school for 5 years or more means that the schools of public health had to provide for review instruction in some rapidly changing subjects. The distribution of

graduate students by years elapsed since receipt of previous degree is as follows:

Years since last previous degree	Graduate students [1]	
	Number	Percent
Total	631	100
Less than 5 years	295	47
5-9	111	18
10-14	117	18
15-19	55	9
20-24	25	4
25-29	8	1
Over 30 years	4	1
Unknown	16	2

[1] Data from individual student schedules received.

Previous Experience

About two-thirds of the 631 graduate students indicated previous experience in health service or medical care, largely representing a year or more of work in an official health agency. Some had had similar experience with health or medical divisions of the armed services, with voluntary health agencies or hospitals, or in private practice, as is shown in the following summary:

Experience	Graduate	Undergraduate	Special
Total [1]	631	336	130
Health or medical experience	437	172	103
Official agencies (Federal, State, or local)	253	30	60
Armed forces	101	65	26
Other health agencies, private practice	83	68	17
Other experience	74	3	10
No experience	108	160	14
Experience not recorded	12	1	3

[1] Data from individual student schedules received.

Slightly more than half of the undergraduate students (51 percent) had had some previous experience related to health or medical care, mainly derived from medical or health divisions of the armed forces or from hospitals. Only 12 percent had had experience in official health agencies, as compared with 40 percent for the graduate students.

Of the 336 graduate students who had been out of school for 5 years or more, 8 reported that they had had no working experience before they entered the school of public health.

Fields of Interest

At most schools, the graduate and special students choose a field of interest representing a special public health activity or a major subject. The candidates for the master of public health degree usually spend approximately a third of their time on courses in their major subject. For other masters' degree candidates, the proportion of time spent on the major subject may vary considerably, depending on the degree, the subject, and the previous training of the student. Special students may follow a program much like that of a degree candidate or they may spend all their time on one subject.

The fields of interest in which students were majoring are shown in table 14. More graduate students were majoring in public health administration (including public health practice and general public health) than in any other subject and, in fact, this was the only subject which had, during the year studied, major students in every school. More than 80 percent of the 115 graduate students majoring in this subject were physicians.

The total number of graduate students specializing in hospital administration was almost as large as the number of public health administration majors even though 4 of the 9 schools did not offer a major in this subject. In three schools (Columbia, Minnesota, Yale) the proportion of students majoring in hospital administration was higher than in any other field.[6] Most of the students majoring in hospital administration had no previous professional degree.

Public health administration, hospital administration, and public health education majors accounted for nearly half of the graduate students in all schools combined. The other graduate students were distributed among a total of 15 other major fields.

At 3 of the 4 schools with undergraduate students, all such students were majoring in public health nursing. At the fourth school (California), the undergraduate students were majoring in public health laboratory, sanitation, preadministration,[7] public health education, combined premedical and public health curriculums, and biostatistics.

Somewhat more than a fifth of the special students were taking public health nursing, most of them at one school (North Carolina). Nearly as many were taking environmental sanitation, most of them

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[6] The count of students majoring in hospital administration includes some students taking their intern or residency training in hospitals, but the returns from this group of students were probably not complete.

[7] This undergraduate major is designed to fill the need for personnel in the rapidly expanding fields of organized health and medical care services, including insurance programs, administrative and personnel services in health departments, and hospital administration.

Table 14. Number of students in each major field at each of 9 schools of public health—1949–50 [1]

Major	All schools	California	Columbia	Harvard	Johns Hopkins	Michigan	Minnesota	North Carolina	Tulane	Yale
Graduate students										
All majors	631	73	105	60	104	78	83	77	13	38
Public health administration [2]	115	8	16	15	30	9	12	10	5	10
Hospital administration	105	6	47	.....	6	.....	35	.....	.....	12
Public health education	86	11	16	1	.....	14	9	27	.....	8
Environmental sanitation [3]	64	8	7	.....	1	13	10	24	.....	1
Tropical public health [4]	40	.....	3	1	18	2	.....	14	8	.....
Microbiology [5]	33	7	.....	3	17	4	1	.....	.....	1
Epidemiology	30	10	4	12	2	2	.....	.....	.....	.....
Maternal and child health	24	5	2	5	5	4	1	.....	.....	2
Public health nursing	24	.....	.....	.....	.....	14	7	2	.....	1
Nutrition [6]	22	2	1	8	8	3	.....	.....	.....	.....
Biostatistics	17	5	1	2	8	1	.....	.....	.....	.....
Industrial hygiene	17	3	7	5	1	.....	.....	.....	.....	1
Medical economics [7]	12	4	.....	4	.....	3	.....	.....	.....	1
Physiological hygiene	2	.....	.....	.....	2	.....	.....	.....	.....	.....
Other [8]	26	.....	.....	4	5	9	8	.....	.....	.....
Not stated	7	4	1	.....	1	.....	.....	.....	.....	1
Undergraduate students										
All majors	336	137	.....	.....	.....	59	129	11	.....	.....
Public health nursing	199	.....	.....	.....	.....	59	129	11	.....	.....
Public health laboratory	48	48	.....	.....	.....	.....	.....	.....	.....	.....
Sanitation	46	46	.....	.....	.....	.....	.....	.....	.....	.....
Preadministration	20	20	.....	.....	.....	.....	.....	.....	.....	.....
Public health education	7	7	.....	.....	.....	.....	.....	.....	.....	.....
Combined premedical and public health	5	5	.....	.....	.....	.....	.....	.....	.....	.....
Biostatistics	4	4	.....	.....	.....	.....	.....	.....	.....	.....
Not stated	1	1	.....	.....	.....	.....	.....	.....	.....	.....
Special students										
All majors	130	22	18	26	10	14	4	23	.....	4
Public health nursing	28	.....	.....	.....	.....	5	.....	23	.....	.....
Environmental sanitation [3]	21	18	.....	1	1	.....	.....	.....	.....	1
Microbiology [5]	13	.....	.....	5	6	2	.....	.....	.....	.....
Nutrition [6]	10	.....	.....	8	2	.....	.....	.....	.....	.....
Biostatistics	8	.....	5	.....	3	.....	.....	.....	.....	.....
Epidemiology	8	.....	2	4	.....	2	.....	.....	.....	.....
Public health administration [2]	8	.....	1	3	2	1	.....	.....	.....	1
Hospital administration	8	.....	4	.....	.....	.....	4	.....	.....	.....
Maternal and child health	7	2	1	1	.....	2	.....	.....	.....	1
Public health education	5	.....	3	1	.....	.....	.....	.....	.....	1
Tropical public health [4]	3	.....	.....	1	2	.....	.....	.....	.....	.....
Industrial hygiene	1	.....	.....	1	.....	.....	.....	.....	.....	.....
Physiological hygiene	1	.....	.....	.....	1	.....	.....	.....	.....	.....
Other [9]	6	1	.....	1	2	2	.....	.....	.....	.....
Not stated	3	1	2	.....	.....	.....	.....	.....	.....	.....

[1] Data from individual student schedules received.
[2] Includes public health practice and general public health.
[3] Includes public health engineering, sanitary engineering, sanitary science.
[4] Includes parasitology, vertebrate ecology, tropical medicine.
[5] Includes bacteriology, public health laboratory.
[6] Includes biochemistry.
[7] Includes medical care administration.
[8] Includes mental health, public health dentistry, venereal disease control, cancer control.

enrolled in a special short course in sanitation at one school (California). There were 15 other departments in which special students were enrolled in the various schools.

Graduate Degrees

More than half of the 631 graduate students enrolled in the 9 schools of public health were working for the degree of master of public health and another 200 were candidates for other masters' degrees. Sixty-five students were working to fulfill the requirements of a doctor's degree (table 15).

Table 15. Number of candidates for various graduate degrees at 9 schools of public health—1949–50 [1]

Degree	Number	Percent	School
All degrees	631	100	
Masters' degrees	566	89	
Master of public health	364	58	All 9 schools.
Master of science	88	14	Columbia, Minnesota, Yale.
Master of science in public health	36	6	North Carolina.
Master of hospital administration	35	5	Minnesota.
Master of science in hygiene	23	3	Harvard, Johns Hopkins.
Master of science in sanitary engineering	10	2	North Carolina.
Master of public health in tropical medicine	8	1	Tulane.
Master of industrial hygiene	2	(2)	Harvard.
Doctors' degrees	65	11	
Doctor of public health	18	3	California, Columbia, Harvard, Johns Hopkins, Yale.
Doctor of science in hygiene	37	6	Harvard, Johns Hopkins.
Doctor of philosophy	10	2	California, [3] North Carolina, Yale.

[1] Data from individual student schedules received.
[2] Less than 0.5 percent.
[3] The Ph. D. is not regularly given by the school of public health, but one student working toward that degree reported that it would be awarded jointly by the school and the department of political science.

During 1949–50, the graduate students were working toward eight different masters' degrees and three different doctors' degrees. Four of the masters' degrees (master of public health, tropical medicine; master of science in sanitary engineering; master of hospital administration; and master of industrial health) are clearly specialists' degrees designed for work in rather self-evident and distinct fields of public health. The master of science in hygiene degree, although not restricted to work in a single field, is also quite clearly distinct in purpose from the other masters' degrees, being used as the first step in the graduate training of "scientists."

On the other hand, the master of science and the master of science in public health degrees are not always clearly differentiated from the master of public health degree. In general, students who are candidates for any one of these three degrees receive practically the same training at the schools of public health; the only clear difference is in the students' qualifications on admission. If a particular student meets the entrance requirements specified by the American Public Health Association for the master of public health degree, he is admitted as a candidate for that degree. If, however, he does not

meet those specific qualifications but does meet the school's own requirements for admission as a graduate student, he is accepted as a candidate for one of the other masters' degrees.[8]

Students reported working for three different doctors' degrees: doctor of public health, doctor of science in hygiene, and doctor of philosophy. The general requirements for the doctor of public health degree are specified by the American Public Health Association. (See appendix A.) Because of these requirements, few students other than physicians are accepted as candidates for this degree. Either the doctor of science in hygiene or the doctor of philosophy degree is awarded after the advanced training of other graduate students, the particular degree used being determined by the school or university.

Financial Assistance

Of the 1,097 students from whom schedules were received, 852 or 78 percent reported that in addition to tuition they were receiving some financial assistance.[9] Nearly all the foreign students (92 percent) and three-fourths of the students from the United States reported that they were receiving such assistance. The proportion of the different types of students reporting assistance was as follows:

	Percentage reporting assistance			
Group	*All students*	*Graduate*	*Undergraduate*	*Special*
All nationalities	78	85	61	88
Foreign students	92	94	67	91
United States students	75	83	61	87

The Veterans' Administration and State and local health departments were the agencies providing assistance to the largest number of these students during the year of this study (table 16). Agencies of the United States Government provided assistance to 36 percent of the foreign students[10] and to 44 percent of the students from the United States. The high proportion of students who received financial assistance points up the schools' dependence on the various supporting agencies for maintaining enrollment.

The financial assistance reported by the students of the schools of public health was in the form of salary for part-time employment, veterans' benefits, fellowships not intended to cover full cost of

[8] See ch. II for a discussion of admission policies.

[9] Exclusive of students reporting scholarships that pay tuition only o
sity employment with the privilege of taking courses tuition free.

[10] The Public Health Service's program for Philippine Rehabilitation and the fellowship program of the Institute for Inter-American Affairs provided most of this assistance to the foreign students.

Table 16. Source of financial assistance for students at 9 schools of public health—1949–50 [1]

Source	All students	Foreign students				United States students			
		Total	Graduate	Undergraduate	Special	Total	Graduate	Undergraduate	Special
Total	1,007	146	110	3	33	861	521	333	07
No assistance reported	245	11	7	1	3	234	90	131	13
All sources	852	135	103	2	30	717	431	202	84
Federal Government	364	48	39	.....	9	316	207	83	26
Veterans' Administration [2]	240	.....	.....	.....	.....	240	147	82	11
Public Health Service	64	27	23	.....	4	37	32	.....	5
Other Federal agencies	60	21	16	.....	5	39	28	1	10
State or local health agencies	212	.....	.....	.....	.....	212	130	44	38
Foundations	75	37	30	.....	7	38	31	2	5
Schools or universities	78	3	2	.....	1	75	46	17	12
International agencies or foreign governments	40	40	27	2	11	.....	.....	.....	.....
Other sources	83	7	5	.....	2	70	17	50	3

[1] Data from individual student schedules received.
[2] Veterans' benefits under the GI bill.

ponds representing part of the usual salary, or full salary. Consequently, the amounts of the payments received in addition to tuition ranged from $19 to $724 a month (appendix B, table 7).

For the 673 students who reported the amount of financial assistance received, the median monthly payment was $145. In this group were 210 students who were receiving GI educational benefits, usually of not more than $120 a month. Excluding the students receiving these veterans' benefits the median monthly payment was $180. Physicians (all of whom were graduate or special students) tended to receive payments somewhat higher than those reported by other graduate and special students. The median payment for foreign physicians was substantially lower than that of the physicians from the United States.

Group	Median payment [1]		
	All graduate and special students	Physicians	Nonphysician graduate and special students
Total	$175	$209	$14
Foreign students	180	187	18
United States students	160	393	14
United States students exclusive of GI students	230	457	19

[1] Data from individual student schedules received.

Alumni of Schools of Public Health

No central source of information exists on the students who have been graduated from the schools of public health. Some of the in-

dividual schools include information about their alumni in either the school catalog or alumni publications, but no summary of the location or positions held by public health schools' alumni is available. As part of the present survey, the school administrators were asked to supply information on the present location and the present position of the persons who had received masters' or doctors' degrees from their schools.

Eight of the nine schools were able to furnish these facts about a large number of their alumni.[11] Information on a total of 3,779 persons was included in these reports. Of these 3,779 alumni, 118 were known to have died. Of the remaining 3,661 who are presumed to be alive, 894 or 24 percent were nationals of foreign countries. Alumni of the schools of public health were reported from many different countries. China had more alumni than any other single foreign country; the Latin American countries taken as a whole had more than any other foreign area.[12]

Of the 2,767 United States alumni presumed to be alive, reasonably current information on location was available for 2,599 persons, reported as residing in every State of the Union,[13] in Alaska, the Canal Zone, Hawaii, Puerto Rico, and the Virgin Islands, or as on military or foreign duty (appendix B, table 8). More than half of the alumni who could be located (51 percent) were concentrated in nine States. These 9 States have 35 percent of the country's population and 40 percent of the full-time State and local health department personnel (*23*). Seven of these nine States have schools of public health which themselves employ many graduates of public health schools. For 7 of the 8 schools reporting, the largest concentration of alumni was in the State where the school of public health is located. The only exception was Johns Hopkins which had the largest number of its alumni in New York State.

Information on the positions held by public health school alumni was available for 2,459 persons (table 17). Somewhat more than half (58 percent) held positions with governmental agencies—almost equally divided among Federal, State, and local governments. One school (Johns Hopkins) had a larger number of alumni in Federal positions than in any other category; two schools (Harvard, Tulane) had the largest number in State agencies; and three (California, Michigan, North Carolina) had more alumni in local governmental agencies than in any other type of position. One school (Minnesota) had the greatest concentration of its alumni in hospital administration

[11] Information on alumni was not available from Columbia.

[12] Data on present location and position were tabulated, in detail, for United States citizens only, because of lack of current, specific information about many of the foreign nationals.

[13] Including the District of Columbia.

positions and one (Yale) in positions with voluntary agencies. Of the 2,459 alumni, 13 percent were in teaching or research positions in colleges or universities, 8 percent in voluntary agencies, 8 percent in private practice, and 3 percent in hospital administration. These data indicate that the major function of schools of public health is the training of personnel for official health and welfare agencies.

Table 17. Present position of United States alumni of 8 schools of public health [1]

Position	Number	Percent
United States alumni with known positions	2,460	100.0
Official health or other public agency	1,434	58.3
Federal	423	17.2
State	510	20.7
Local	501	20.4
University or college teaching or research work	319	13.0
Voluntary health or welfare agency or foundation	191	7.8
Private practice	180	7.7
Hospital administration	85	3.4
Housewife	72	2.9
Business or industry	62	2.5
Retired	34	1.4
All other known positions	73	3.0

[1] Data not available from Columbia. Alumni defined as recipients of masters' or doctors' degrees.

CHAPTER IV. Financial Status of the Schools

THE FINANCIAL schedules submitted by the schools of public health for this study provided data on income and expenditures for current operations and for separately budgeted research. The financial data were available in reasonably comparable form for all schools. This comparability is attributable, at least in part, to the development, in 1935, of accounting rules and procedures by the National Committee on Standard Reports for Institutions of Higher Education (*24*). In general, the classification of expenses and income used in this study follows the definitions recommended by that Committee.

As mentioned previously, there are differences among the schools in programs, organization, and relationships with other units of the university, and in student-body composition. These conditions require certain distinctive accounting procedures in each school. Thus, minor modifications in the reported data were necessary in order to derive comparable operating costs.

Because, in several important respects, the financial structure of the schools under public control differed from that of private institutions, certain of the financial characteristics of these two types of institutions are compared, particularly in relation to sources of income.

Expenditures

Basic Operating Expense

A useful index in studying the operating costs of educational institutions is the basic operating expense. This figure is derived by combining certain direct and indirect operating expenses. The direct expenses include expenditures for salaries, supplies, and certain equipment for teaching, departmental research, and community service. In this report all these direct expenses are grouped as "instruction." The indirect expenses include amounts spent for administration, plant operation and maintenance, and libraries. Expenditures for separately budgeted (project) research, for operating clinics and health centers, and for noneducational activities are not included in the basic operating expense (*25*).

The chief problems encountered in the collection of the financial data from the schools related to (1) apportioning university administrative expense to the school of public health and (2) prorating expenses for services shared jointly by the school of public health and other units of the university. Each school was able to prorate these

shared costs, although the methods of prorating the amounts varied considerably.

The 9 schools of public health spent nearly $3 million during the study year for basic operations (table 18). The amounts spent by individual schools varied widely, the highest expenditure being almost five times that of the lowest. Instruction accounted for 69 percent of the combined basic operating expense for the nine schools of public health—approximately the same proportion as was found for medical schools in 1947–48 (*25*) and for dental schools in 1949–50 (*18*). The percentage distribution of the basic operating expense among the four items of expense was as follows:

Basic operating expense	*Percent*
Total, 9 schools	100
Instruction	69
Administration and general	16
Plant operation and maintenance	13
Libraries	2

Table 18. Basic operating expense at each of 9 schools of public health—1949–50

Form of control and school	Total basic operating expense	Instruction	Administration and general	Plant operation and maintenance	Libraries
Nine schools	$2, 955, 097	$2, 034, 704	$475, 854	$371, 677	$73, 702
Public control	1, 374, 406	968, 003	210, 453	130, 742	50, 118
California	405, 364	300, 760	57, 488	35, 116	12, 000
Michigan	400, 682	277, 079	87, 784	20, 810	15, 009
Minnesota	240, 027	157, 691	30, 717	50, 007	2, 509
North Carolina	321, 433	232, 561	40, 464	27, 809	20, 609
Private control	1, 581, 591	1, 066, 071	259, 401	231, 036	23, 584
Columbia	244, 213	143, 905	43, 443	51, 560	5, 305
Harvard	487, 318	325, 704	83, 859	72, 755	5, 000
Johns Hopkins	589, 872	437, 073	82, 071	63, 128	6, 700
Tulane	120, 000	77, 700	20, 520	24, 880	2, 900
Yale	134, 188	81, 389	29, 508	10, 072	3, 619

Salary and Nonsalary Expense

Instructional expense could be divided between salary and nonsalary expense for 8 of the 9 schools (table 19). For these 8 schools combined, 77 percent of the expenditures for instruction was for salaries—69 percent for professional and 8 percent for nonprofessional personnel. The three schools (Columbia, Tulane, Yale) which showed the highest proportion for salaries, and therefore the lowest for nonsalary expenses, were schools closely integrated with a medical school, with which they may have shared some of the nonsalary expenses.

Table 19. Salary and nonsalary instructional expense at each of 8 schools of public health—1949–50

School	Instructional expense	Salary		Nonsalary
		Professional	Nonprofessional	
	Amount			
Eight schools	[1]$1,802,204	$1,246,197	$143,576	$412,431
California	300,760	197,290	27,107	76,363
Columbia	143,905	115,686	20,985	7,234
Harvard	326,704	214,858	9,894	100,952
Johns Hopkins	437,973	266,911	39,930	101,132
Michigan	277,070	179,397	29,763	76,910
Minnesota	167,604	109,321	15,107	33,266
Tulane	77,700	58,360	5,086	14,320
Yale	81,389	74,434	4,710	2,245
	Percentage distribution			
Eight schools	100	69	8	23
California	100	66	9	25
Columbia	100	80	15	5
Harvard	100	66	3	31
Johns Hopkins	100	68	9	23
Michigan	100	65	7	28
Minnesota	100	69	10	21
Tulane	100	75	7	18
Yale	100	91	6	3

[1] Instructional expense by salary and nonsalary items not available for the North Carolina school.

Table 20. Salaries of full-time faculty according to academic title at 9 schools of public health—1949–50

Academic title	Nine schools	Public control	Private control
	Median salary		
Professor	$9,050	$8,000	$10,000
Associate professor	7,000	6,090	7,250
Assistant professor	5,146	4,035	5,509
Instructor	3,600	3,700	3,600
	Salary range		
Professor	$5,750–$15,250	$5,750–$15,250	$9,200–$14,500
Associate professor	4,483– 10,000	4,483– 7,000	4,800– 10,000
Assistant professor	2,850– 7,500	3,325– 5,400	2,850– 7,500
Instructor	1,485– 5,600	1,485– 4,800	3,000– 5,600

Data on the salaries of full-time faculty (Status A) were obtained from each school.[1] Table 20, giving the median salary for specified ranks during the year 1949–50, shows, as would be expected, a progressive increase in median salary from the position of instructor to that of professor. In general, except for instructors, the median salaries for the group of private schools were substantially higher

[1] Salary data of Status B and C staff were also collected but have not been analyzed. See ch. III for definition of the three status groups.

than for the group of public schools, but in each group a broad range in salaries appeared within each rank. Thus, of the 50 professors included in the data, 14 received $12,000 or more per year, while 18 received less than $9,000. Of the 47 associate professors, 1 received $10,000, 5 received $9,000, and 19 received less than $6,200 per year. Among the 34 assistant professors, 8 received $6,000 or more per year, while 11 received less than $5,000. Only 3 of the 17 instructors received $4,500 or more, while 11 received less than $4,000.

Departmental Instructional Expense

The wide differences among the schools of public health in programs and university relationships are reflected in great variations in departmental organization [2] and in the financial data reported for individual departments. In the schools which operate with a high degree of autonomy, expense items were reported for each department in considerable detail. On the other hand, relatively little detail on departmental expenditures was available for schools which are closely integrated with other divisions of the university, sharing physical and administrative facilities and services. Two schools (North Carolina, Yale) could not furnish data on instructional expense by department (see appendix B, table 9, for departmental data reported).

The distribution of instructional expense by department for a total of seven schools is shown below:

Department	*Amount*	*Percentage distribution*
Instructional expense, seven schools	[1] $1, 720, 815	100
Public health administration	406, 435	24
Biostatistics	191, 620	11
Public health education	44, 505	8
Environmental sanitation	130, 127	8
Epidemiology	167, 515	10
Hospital administration	51, 480	3
Industrial hygiene	70, 059	4
Maternal and child health	111, 010	6
Medical economics	32, 203	2
Microbiology	142, 750	8
Public health nursing	20, 101	1
Nutrition	72, 603	4
Physiological hygiene	106, 729	6
Tropical public health	153, 007	9
All other	19, 171	1

[1] Departmental data not available for the North Carolina and Yale schools.

[2] The organization of the schools of public health is described in ch. II.

Separately Budgeted Research

During 1949–50 the nine schools of public health together spent about half as much for separately budgeted research [3] as they did for basic operating expenses (table 21). The amount spent for research ranged from $30,000 to $453,000. The ratio of research expenditures to basic operating expense also varied widely. At one school the ratio was 1 to 10, while at another school the amount spent for separately budgeted research almost equaled the expenditures for basic operations. For the nine schools combined, $50 was spent for separately budgeted research for every $100 for basic operations. The ratio for the private schools was $62 to $100 and for public schools $37 to $100.

For 7 of the 9 schools of public health,[4] separately budgeted research could be identified with individual departments (appendix B, table 10). The departments of epidemiology showed the largest expenditure for research budgeted separately. No expenditure for this activity was reported for hospital administration departments. The distribution of total expense for separately budgeted research by department for the seven schools was as follows:

Department	*Amount*	*Percentage distribution*
Expense for separately budgeted research, 7 schools	[1] $1,221,835	100
Public health administration	129,754	11
Biostatistics	43,010	4
Public health education	935	(2)
Environmental sanitation	48,945	4
Epidemiology	311,414	26
Hospital administration	----------	0
Industrial hygiene	102,028	8
Maternal and child health	24,843	2
Medical economics	23,962	2
Microbiology	164,588	13
Public health nursing	29,999	2
Nutrition	151,710	12
Physiological hygiene	81,020	7
Tropical public health	102,004	8
All other	7,017	1

[1] Departmental data not available for the North Carolina and Yale schools.
[2] Less than 0.5 percent.

[3] Separately budgeted research represents research projects for which the schools maintain separate accounts. Such funds are obtained mainly from sources outside the university such as governmental agencies, foundations, or industrial organizations. Research expenses which are not segregated from basic operating expenses have been excluded from the figures used here. Estimates of the amount of funds used for departmental research are shown later in this chapter.

[4] Two schools (North Carolina, Yale) did not furnish data by department on expenses for research budgeted separately.

The total expense of $1,488,688 for separately budgeted research could be divided into salary and nonsalary expense for 8 of the 9 schools (table 22). Nearly equal shares were spent for salaries and for nonsalary expenses. In contrast, approximately three-fourths of the instructional expense went for salaries and one-fourth for nonsalary expense. The relatively large amount of nonsalary expense for research projects results from the fact that special equipment and supplies are important items in research.

Table 21. Relationship of expense for research budgeted separately to basic operating expense at each of 9 schools of public health—1949–50

Form of control and school	Basic operating expense	Expense for research budgeted separately	Research expense per $100 of basic operating expense
Nine schools	$2,055,007	$1,488,688	$50
Public control	1,374,406	512,198	37
California	405,304	42,070	10
Michigan	406,682	146,927	36
Minnesota	240,027	87,153	36
North Carolina	321,433	236,048	73
Private control	1,681,501	976,490	62
Columbia	244,213	30,630	10
Harvard	487,318	453,601	93
Johns Hopkins	589,872	420,704	71
Tulane	120,000	31,754	25
Yale	134,188	30,805	23

Table 22. Salary and nonsalary expense for research budgeted separately at each of 8 schools of public health—1949–50

School	Expense for research budgeted separately	Salary		Nonsalary
		Professional	Nonprofessional	
Eight schools	[1]$1,252,640	$350,621	$237,733	$664,286
California	42,070	21,700	2,663	17,707
Columbia	30,630	0,300	8,607	24,669
Harvard	453,601	130,170	71,002	242,439
Johns Hopkins	420,704	70,417	03,060	247,408
Michigan	146,927	40,054	20,606	07,277
Minnesota	87,153	34,030	15,100	37,327
Tulane	31,754	10,050	0,120	0,584
Yale	30,805	0,400	0,430	17,075

[1] Expense for research budgeted separately by salary and nonsalary items not available for the North Carolina school.

The number of full-time faculty at a school determines to a large extent the volume of research conducted at the institution and shows a high degree of correspondence with the school's expenditures for separately budgeted research (table 23). In general, the schools with

the largest full-time faculties also showed the greatest expenditure for separately budgeted research per full-time faculty member. The three schools with the largest numbers of full-time faculty members accounted for 75 percent of the total project research expenditures for all schools and also showed the highest research expenditures per full-time faculty member.

Table 23. Research expenditure per full-time faculty member at each of 9 schools of public health—1949–50

School	Full-time faculty [1]	Expense for research budgeted separately	Research expense per full-time faculty member
Nine schools	232	$1,488,688	$6,417
Harvard	50	453,601	9,072
Johns Hopkins	37	420,794	11,373
North Carolina	31	236,048	7,614
California	28	42,070	1,502
Michigan	26	146,927	5,651
Minnesota	20	87,153	4,358
Columbia	19	39,536	2,081
Tulane	14	31,754	2,268
Yale	7	30,805	4,401

[1] Status A, full-time employment in the school of public health.

Total Educational Expenses

Expenditures for basic operations and for separately budgeted research can be combined to indicate the aggregate expenditures for all educational activities of an institution. In the fiscal year 1949–50, the 9 schools of public health spent a total of $4,444,685 for basic operations and separately budgeted research (table 24). Among schools, the amount spent for edueational activities ranged from $157,754 to $1,010,666. Four schools spent more than $500,000 each, while three spent less than $300,000. The range in total educational expenditures was greater than in basic operating expense.

Table 24. Total educational expense at each of 9 schools of public health—1949–50

School	Total	Basic operating expense	Expense for research budgeted separately
Nine schools	$4,444,685	$2,955,997	$1,488,688
California	447,434	405,364	42,070
Columbia	283,740	244,213	39,536
Harvard	940,019	487,318	453,601
Johns Hopkins	1,010,666	589,872	420,794
Michigan	553,608	406,682	146,927
Minnesota	328,080	240,927	87,153
North Carolina	557,481	321,433	236,048
Tulane	157,754	126,000	31,754
Yale	164,993	134,188	30,805

Income

Basic Operating Income

The basic operating income unit is parallel in concept to the basic operating expense unit. Accordingly, income used for research budgeted separately and for noneducational activities has been deducted from total income. Furthermore, in this concept, the combined basic income for all schools must equal the combined basic operating expenses. Since the nine schools of public health together had a net deficit in 1949–50, this deficit has been allocated to university transfers on the assumption that universities ultimately maintain the solvency of their component schools.

The sources of total income for basic operating expenses are shown in table 25. The pattern of financial support differed significantly between the two groups of schools, public and private. In 1949–50 endowments and gifts accounted for 74 percent of the income of private schools and for only 12 percent of the income of public schools. On the other hand, 71 percent of the income of public schools came from State appropriations and university transfers, while only 11 percent of the income of private schools came from these sources. The high proportion of income from State appropriations and university transfers for the public schools suggests that they have a greater degree of financial stability than is characteristic of private schools. In contrast, the dependence of private institutions on gifts and grants puts some of these institutions in an uncertain position as far as long-range financial support is concerned.

Table 25. Source of income for basic operations at 9 schools of public health—1949–50

Source of income	Nine schools	Public control	Private control
	Amount		
All sources	$2,955,997	$1,374,406	$1,581,591
Tuition and fees	425,052	220,410	195,642
Endowment income	577,300	12,028	565,362
Gifts and grants	742,701	140,007	593,634
State appropriations and university transfers	1,161,736	980,273	181,463
Miscellaneous	49,118	3,028	45,490
	Percentage distribution		
All sources	100	100	100
Tuition and fees	14	17	12
Endowment income	20	1	36
Gifts and grants	25	11	38
State appropriations and university transfers	39	71	11
Miscellaneous	2	(1)	3

[1] Less than 0.5 percent.

Tuition and Fees

During 1949–50, the Veterans' Administration was the largest single source of tuition and fees received by schools of public health, furnishing 33 percent of the total for the 9 schools. These payments represented educational benefits for World War II veterans under the Servicemen's Readjustment Act. The Public Health Service and other Federal agencies paid 11 percent of the total tuition and fees; foreign governments and the World Health Organization together accounted for 6 percent of the total. Agencies of State and local governments were the source of 17 percent of the tuition and fees (appendix B, table 11). The distribution of tuition and fees, by source, is shown below:

Source	*Amount*	*Percentage distribution*
All sources, 9 schools	$425,052	100
Students	97,545	23
Veterans' Administration	141,360	33
State and local agencies	73,418	17
Foundations	32,101	8
Public Health Service	28,706	7
Other Federal agencies	18,951	4
Foreign governments	11,405	3
World Health Organization	11,383	3
All other agencies	10,093	2

The data above show that 23 percent of the total income from tuition and fees was paid by the students themselves. More than half of the students who paid their own tuition and fees were undergraduates. Of the total number of undergraduate students, 40 percent paid their own tuition and fees; of the graduate students only 15 percent did so.

The relative importance of the various sources of income has undoubtedly changed since 1949–50, because of the reduction in the number of veterans eligible for educational benefits and the increase in international health activities.

Type of Funds

Because general funds permit greater flexibility of operation than do restricted funds, they constitute a more desirable type of income for any institution of higher learning. Funds in the form of restricted endowments, gifts, or grants—since they finance only specific activities—cannot be used for other purposes that may be in more urgent need of support. The public schools were in a somewhat bet-

ter position in this respect than were the private schools, since the public schools received 86 percent of the funds used for direct instruction from general funds and the private schools, 68 percent (table 26).

Table 26. Type of funds used for instruction of each of 9 schools of public health—1949–50

Form of control and school	Total funds used for instruction	Type of funds	
		General	Restricted
	Amount		
Nine schools	$2,034,704	$1,564,863	$470,901
Public control	968,003	832,411	135,632
California	300,760	265,760	35,000
Michigan	277,079	274,223	2,856
Minnesota	157,604	150,174	7,520
North Carolina	232,560	142,254	90,306
Private control	1,066,671	722,452	344,219
Columbia	143,905	131,801	12,104
Harvard	325,704	173,774	151,930
Johns Hopkins	437,073	308,718	128,255
Tulane	77,700	77,700	----------
Yale	81,389	30,459	50,930
	Percentage distribution		
Nine schools	100	76	24
Public control	100	86	14
California	100	88	12
Michigan	100	99	1
Minnesota	100	95	5
North Carolina	100	61	39
Private control	100	68	32
Columbia	100	92	8
Harvard	100	53	47
Johns Hopkins	100	70	30
Tulane	100	100	0
Yale	100	37	63

Sources of Income for Research Budgeted Separately

Each school received some funds for research budgeted separately from one or more Federal agencies—the Public Health Service, Army, Navy, Atomic Energy Commission, for example. These Federal agencies furnished more than half (56 percent) of the total amount used for this purpose. The Public Health Service constituted the largest single source of funds for research budgeted separately in all nine schools of public health combined. Foundations contributed 35 percent of the total amount used for separately budgeted research, all but one school reporting funds from this source (table 27).

As a group, the public schools received 70 percent of their separately budgeted research money from Federal agencies, the private schools, 49 percent. On the other hand, the private schools received relatively more support for research from foundations than did the public

Table 27. Source of income for research budgeted separately at each of 9 schools of public health—1949–50

Form of control and school	Total research budgeted separately	Source of income				
		Public Health Service	Other Federal agencies	Foundations	Industry	All other
Nine schools	$1,488,088	$653,722	$181,265	$520,820	$113,438	$10,437
Public control	512,198	313,403	44,399	144,805	105	9,426
California	42,070	----	7,670	28,400	----	6,000
Michigan	146,027	3,373	36,720	105,880	105	780
Minnesota	87,153	84,330	----	2,823	----	----
North Carolina	236,048	225,700	----	7,702	----	2,646
Private control	976,490	340,319	136,866	376,021	113,273	10,011
Columbia	30,536	22,148	----	7,884	9,501	----
Harvard	463,601	150,549	98,029	120,218	82,877	1,028
Johns Hopkins	420,794	123,746	38,837	237,884	12,244	8,083
Tulane	31,754	28,601	----	----	3,153	----
Yale	30,805	15,275	----	10,035	5,495	----

schools and received practically all the research money made available by industry.

Adjusted Expenditures

Basic Operating Expenses for Graduate Instruction

Although the methods of accounting in the different institutions varied, considerable comparability in the basic operating expense for graduate students has been achieved by making certain allocations of the financial data from each school. Thus professional salaries were prorated between graduate and undergraduate programs in the same ratio that faculty members reported dividing their teaching time. Other elements of instruction, namely expenses for nonprofessional salaries and for nonsalary items, were also allocated to undergraduate or graduate instruction in proportion to the distribution of faculty time (table 28). The indirect expenses such as administration, plant

Table 28. Basic operating expense for graduate and undergraduate students enrolled at each of 9 schools of public health—1949–50

School	Total basic operating expense	Graduate expense	Undergraduate expense
Nine schools	$2,055,007	$2,895,507	$120,430
California	405,304	367,404	37,900
Columbia	244,213	244,213	----
Harvard	487,318	487,318	----
Johns Hopkins	580,872	580,872	----
Michigan	406,682	373,268	33,414
Minnesota	240,027	215,127	25,800
North Carolina	321,433	298,177	23,256
Tulane	126,000	126,000	----
Yale	134,188	134,188	----

operation and maintenance, and libraries were considered to be fixed charges necessary to maintain the graduate instructional program and therefore were not prorated.

These adjustments were necessary for the four schools (California, Michigan, Minnesota, North Carolina) which had programs of undergraduate instruction. For two reasons the ratio of expenditures for undergraduate education to expenditures for graduate education was much smaller than the ratio of undergraduate to graduate enrollment. First, undergraduate education is much less expensive than graduate education, requiring less faculty time per student. Second, as indicated above, indirect expenses were not divided between the two levels of instruction, because it was assumed that such expenditure would be essential to the maintenance of graduate education, regardless of the possible use of the same facilities for teaching undergraduate students. The $120,000 estimated as the expenditure for undergraduate instruction therefore reflects an additional rather than a proportional cost of such instruction. It is felt that this approach is a sound basis for comparing the costs of graduate education in the several schools. It is obvious that it fails to indicate the cost of providing an equivalent amount and quality of undergraduate instruction in a university without a school of public health.

Unit Cost

The application of the unit-cost concept (that is, cost per student) in university accounting has been criticized because variations in the classification and recording of expenditures may invalidate comparisons among institutions. It should be emphasized that, although the unit cost is useful as an index of total expenditures for maintaining an academic program, it should not be used as a basis for making comparisons of either quality or efficiency of education in the various institutions—evaluations that are beyond the scope of this study. In spite of its limitations, the unit cost, if considered with other characteristics of the schools of public health, has certain value. It provides a convenient device for translating aggregate expenditures into terms that are comparable among institutions.

Unit costs were derived by dividing basic operating expenses for graduate instruction by the number of graduate students enrolled. The basic operating expense includes costs for most of the community service activities of the faculty as well as for departmental research.[5] It is generally conceded that these functions are essential to graduate education and should not be dissociated from it. The unit cost, therefore, reflects the whole cost of preparing a graduate student for work in

[5] Research other than that separately budgeted.

the field of public health and not merely the cost of teaching as used in the more restricted sense of the word.

The average basic operating expense per graduate student based on data from the 9 schools was $4,182 (table 29). This unit cost ranged from $2,130 to almost $10,000. The expense per student was higher at the private schools ($4,584) than at the schools under public control ($3,766). Differences among schools in costs per graduate student are the result of a number of factors, such as differences in organization and program, number of full-time faculty, size of student body, and volume of research. Many of these factors have been described earlier in the report.

Table 29. Basic operating expense per graduate student at each of 9 schools of public health—1949–50

Form of control and school	Number of graduate students [1]	Graduate basic operating expense	Expense per graduate student
Nine schools	678	$2,835,567	$4,182
Public control	333	1,253,976	3,766
California	73	367,404	5,033
Michigan	82	373,268	4,552
Minnesota	101	215,127	2,130
North Carolina	77	298,177	3,872
Private control	345	1,581,591	4,584
Columbia	110	244,213	2,220
Harvard	61	437,318	7,089
Johns Hopkins	113	589,872	5,220
Tulane	13	126,000	9,692
Yale	48	134,188	2,796

[1] Estimated number, see table 10.

Exchange of Instructional Services

In considering the operating expense of a school of public health it should be recognized that the school exchanges teaching services with other units of the university. The proximity of the school of public health to other units of the university, the types of students taught, and university policies all affect the volume of such exchanges. In a study limited to determination of the financial status of a university, exchanges of services might well be disregarded. As soon, however, as an attempt is made to estimate the total costs of maintaining the academic program of a unit of a university, an effort must be made to measure with relative accuracy the monetary value of such exchanges.

The extent to which the value of exchanges of services was reflected in the basic operating expense varied from school to school. Analysis of the financial data indicates that the schools' financial accounts record many of these exchanges of instructional services. It was

necessary, however, to isolate and record the additional exchanges which were not indicated in the schools' accounts.

Exchanges of services among schools of public health and other schools were identified for this study by means of review of catalogs, records of interviews with deans, and schedules which were completed by the schools. The data thus compiled were then discussed with the deans to determine which items were the most significant. This information, supplemented by a study of enrollment and course records where such records were available, was analyzed to determine the numbers of public health students taking specific courses in other schools and the numbers of "other" students participating in courses in the school of public health.

Interviews were arranged with faculty members of the school of public health responsible for teaching the courses in which students of other schools were enrolled. Similar interviews were held with faculty members of other schools who were giving courses taken by students of public health. During these interviews an effort was made to determine the cost of the course by estimating the value of faculty time and other instructional expenses involved. These costs were then distributed in proportion to the number of students from the different units of the university who participated in the course. For example, if 3 students from another school participated in a seminar given at the school of public health with a total enrollment of 12 students, only three-fourths of the estimated cost of the course was allocated to the school of public health, thus reducing the school's cost of maintaining that seminar. Instructional services received by students of the school of public health from other schools were evaluated in the same manner and appropriate additions were made to the recorded expenditures of the school of public health. When the services contributed by each of the two university units were more or less equal no allocations were made.

Table 30. Adjustment in basic operating expense for exchange of instructional services at each of 9 schools of public health—1949–50

School	Basic operating expense	Adjusted basic operating expense	Allocations		Balance
			To school of public health	From school of public health	
Nine schools	$2,055,007	$2,843,106	$30,680	$140,577	—$112,801
California	405,304	383,003		21,461	—21,461
Columbia	244,213	240,074	2,887	5,876	—3,539
Harvard	487,318	467,537		19,781	—19,781
Johns Hopkins	589,872	587,970	2,160	4,052	—1,902
Michigan	409,682	391,332	2,872	18,222	—15,350
Minnesota	240,027	187,323	9,302	62,906	—53,604
North Carolina	321,433	316,999	500	4,931	—4,431
Tulane	126,000	120,558	2,700	8,142	—5,442
Yale	134,188	146,810	10,825	4,203	+12,022

Adjustments for exchanges of services were made only in the item of instructional expense. The net result of these changes amounted to a reduction of $112,891 or 4 percent of the total basic operating expense for all 9 schools combined (table 30). In these adjustments, indirect expenses such as administration, plant maintenance, and library were not prorated, and no effort was made to estimate the value of services of volunteer faculty. The adjusted expense thus represents the university's expenditures in maintaining a program of instruction in public health, and does not represent the full cost of that program. The full cost would need to include the value of volunteer services received by the school.

The procedure adopted in this study differs from methods used in the past, and admittedly is not entirely satisfactory. Many faculty members found it hard to estimate the proportion of their time given to a particular course, and it was equally difficult in many cases to estimate other instructional costs such as materials used in laboratory courses. The results of this analysis, therefore, can be considered only as approximations. Whether more detailed study of this question is justified depends upon the advantages of measuring costs of individual units in the university. If the need for such information is sufficiently great to warrant the time and effort involved in cost accounting, further consideration should be given to the development of definitive and generally applicable methods of allocation.

Components of Instructional Expenses

As indicated earlier in this report (chapter II) activities of the schools of public health have been grouped into three major functions—teaching, research,[6] and community service. In a further effort to analyze the financial data furnished by the schools, the costs of these functions have been estimated. Faculty-time distributions provided a reasonable means of allocating instructional expenses (as defined in the discussion of basic operating expenses) among the various functions, since the activities of the faculty account for the major share of the instructional expenses. The estimates of distribution of time according to function submitted by members of the faculty were used as a basis for distributing expenses among these functions. Briefly the procedure followed was:

a. The cost of faculty time spent on each function (teaching, separately budgeted research, departmental research, and community service) was computed

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[6] Research includes both separately budgeted research plus a portion of the instruction activities which in this report is designated as departmental research.

[7] For the purpose of this analysis, estimated faculty time spent on administration was included with estimated time given to teaching. Time spent on administrative duties of persons responsible for overall school administration, however, was excluded.

by applying estimates of time distribution of individual faculty members to their salaries.

b. The cost of faculty time for each function was totaled for each school. Subtracting the cost of separately budgeted research from the total research expenditures resulted in the determination of departmental research. Then the ratio of each function to the total was applied to the total instructional expense of the school.

By following this procedure it was found that, for all schools combined, 76 percent of the instructional cost was related to teaching, 17 percent to departmental research,[8] and 7 percent to community service (table 31). Among individual institutions the proportion of instructional expense given to teaching ranged from 67 percent to 86 percent. In the group of public institutions 82 percent of instructional expense was given to teaching, whereas for the group of private schools this function accounted for 71 percent. Conversely, for the public schools 12 percent of the instructional expense was for departmental research and for the private schools, 21 percent.

Table 31. Components of instructional expense at each of 9 schools of public health—1949–50

Form of control and school	Total instructional expense	Teaching	Departmental research [1]	Community service
Nine schools	$2,034,764	$1,553,727	$340,320	$140,717
Public control	968,093	796,314	112,628	59,151
California	300,760	252,039	27,068	21,653
Michigan	277,079	220,975	33,260	12,854
Minnesota	167,694	123,001	22,077	12,616
North Carolina	232,560	190,699	30,233	11,628
Private control	1,066,671	757,413	227,692	81,566
Columbia	143,905	100,490	28,781	8,634
Harvard	325,704	221,479	68,398	35,827
Johns Hopkins	437,973	293,442	122,632	21,899
Tulane	77,700	66,822	5,430	5,439
Yale	81,389	69,180	2,442	9,767

[1] Research other than that separately budgeted.

The lack of standard definitions for the three functions, when faculty members estimated the distribution of their time, obviously means that these data are subject to limitations. Nevertheless, the findings proved to be consistent with other observations of the financial characteristics of the schools. For example, a direct relation was found between expenditures for separately budgeted research and for "departmental" research computed by this procedure (see table

[8] Research other than that separately budgeted.

32). The direct relationship found between these two values based on independent sets of data in this study would, to a degree, substantiate the validity of estimates of time distribution furnished by faculty members. It appears that this method of analysis may provide a useful key for further studies of costs among professional schools which show wide variations in program.

Table 32. Departmental and separately budgeted research expense at each of 9 schools of public health—1949–50

School	Total research expense	Research budgeted separately	Departmental research
	Amount		
Nine schools	$1,820,008	$1,458,688	$340,320
California	69,138	42,070	27,068
Columbia	68,317	39,536	28,781
Harvard	521,999	453,601	68,398
Johns Hopkins	513,426	420,794	122,632
Michigan	180,177	146,927	33,250
Minnesota	109,230	87,153	22,077
North Carolina	266,281	236,048	30,233
Tulane	37,193	31,754	5,439
Yale	33,247	30,805	2,442
	Percentage distribution		
Nine schools	100	81	19
California	100	61	39
Columbia	100	58	42
Harvard	100	87	13
Johns Hopkins	100	77	23
Michigan	100	82	18
Minnesota	100	80	20
North Carolina	100	89	11
Tulane	100	85	15
Yale	100	93	7

Total Research Expenditures

The total direct expenditure for the support of research in schools of public health can be computed by adding the estimated costs of departmental research to expenditures for separately budgeted research. The 9 schools of public health together spent $1,820,008 for their combined programs of departmental and project research (table 32). For all schools combined, departmental research expenditures amounted to 19 percent of total expenditures for research. Among individual schools, this proportion ranged from 7 to 42 percent. Differences in the ratio of expenditures from departmental funds to those from separately budgeted funds probably stem from differences in the nature of research, costs of necessary equipment, and staffing of research projects.

Endowments

Endowment funds reported by the schools of public health represented endowments specifically earmarked for the schools' use. The funds thus reported excluded general university endowments and endowments for medical schools, which also contributed to the support of the schools of public health.

At the end of the fiscal year 1949–50, 5 of the 9 schools of public health had endowment funds totaling $13.1 million (table 33). The endowment funds were largely concentrated in two private schools which controlled 86 percent of the total. The total endowment principal was primarily in the form of general endowments, the income from which may be used without restriction—88 percent of the total was of this type. Since 1946–47, the total endowment of schools of public health has increased slightly, the increase amounting to less than $1 million or 7 percent.

Table 33. Comparison of endowment funds at each of 9 schools of public health for years 1949–50 and 1946–47

School	All categories	General	Restricted	Temporary
	End of fiscal year 1949–50			
Nine schools	$13,135,830	$11,577,055	$1,084,544	$173,040
California				
Columbia				
Harvard				
Johns Hopkins	5,478,810	4,391,333	1,084,477	
Michigan	5,820,222	5,520,043	67	300,112
Minnesota				
North Carolina	173,528			173,528
Tulane				
Yale	1,147,667	1,147,667		
	506,612	506,612		
	End of fiscal year 1946–47			
Nine schools	$12,223,700	$10,909,603	$476,011	$837,180
California				
Columbia				
Harvard				
Johns Hopkins	4,370,758	3,893,912	476,846	
Michigan	5,692,276	5,361,412	65	330,799
Minnesota				
North Carolina	506,387			506,387
Tulane				
Yale	1,147,667	1,147,667		
	506,612	506,612		

CHAPTER V.

Needs of Schools of Public Health

A STUDY of the financial status and needs of schools of public health cannot consider these institutions as isolated entities. Like other graduate schools, the schools of public health depend in large measure on their parent universities for financial support.

Most institutions of higher learning are experiencing financial difficulties, as a result of several important trends in the last decade. Since World War II, there has been a great increase in demand for college and university training. Enrollments have increased and courses of instruction and research have had to be expanded in response to public demand and to keep pace with the rapidly growing volume of scientific knowledge, particularly in the biological and physical sciences. Moreover, the faculties of universities and colleges have had to meet increasing demands for consultation service to industry, government, and international agencies. In consequence, many universities are exceeding the limits of their financial resources, staff, and physical facilities.

Coincident with the increasing demand for services, the costs of providing those services have been advancing. No compensating increase in amount or sources of financial support has been available to meet the costs of maintaining our academic institutions. Many universities which in previous years had rich reserves on which to draw in times of stress now find these reserves seriously depleted.

The effect of these developments has been particularly severe in the scientific and professional branches of the university, branches that are among the most costly to maintain. The problem is especially acute in the schools training professional personnel in public health because of the rapid expansion in the scope and content of public health practice. Schools of public health have not only had to introduce many new courses but have also had to adjust those courses to the training of many different types of students. As a result, the physical facilities of most of these schools have become seriously crowded. The schools lack funds, facilities, and staff to give the wide variety of training considered necessary to keep pace with developments in public health practice and with demands for participation in public health activities throughout the United States and in foreign countries.

Precise measurements of the needs in an educational field would require detailed objective standards for facilities and program. Such standards for public health training, however, are not available or even desirable. Within the general framework of standards recom-

mended by the American Public Health Association, the director and the faculty at each school are responsible for translating public health trends, practices, and needs into an educational program. Many questions concerning objectives of professional education in public health—questions of method, content, organization, quality, facilities, costs, and financing—must therefore be resolved by the school itself. Its administrative staff must decide the types of students to be trained, the new areas of instruction and research to be developed, and the established areas that should be modified, expanded, or reduced. As a result of such decisions, concepts of "educational deficits" at each school are developed, plans are projected, and needs are estimated. This section of the report summarizes the statements on deficiencies and plans and the estimates of needs furnished by the deans and faculties of the several schools. These evaluations and estimates cover areas of activities curtailed because of limited resources; requirements for additional personnel; and needs for additional funds to meet operating expenses and to improve plant and equipment.

Curtailment of Activities

Because of their financial straits, some universities were forced to restrict the operations of the schools of public health during the study year. For example, one university (Tulane) ordered the elimination of all unfilled positions. Another (North Carolina) required a 50-percent reduction in the budget for nonsalary expenditures. A third (Columbia) had accumulated a deficit during the preceding 10 years and therefore could not provide all the additional funds necessary for new positions essential to the development of the school's program. Still another university (Minnesota) faced a serious deficit and had ordered cutbacks in all requests for new positions; moreover salaries at its school of public health had not been adjusted since 1946. One school of public health (Johns Hopkins) used more than $20,000 of its endowment principal during the study year to meet current operating costs. Another school (California) was so limited in space that the university had requested assurance that needed space would be available, before it would authorize employment of additional personnel.

As financial stresses have increased, the capacity of the schools to adjust to new needs and circumstances has declined. Some schools have come to depend heavily on gifts and grants to finance current operations,[1] thus limiting both the flexibility in planning and the long-range stability of these schools.

Deans of four schools (California, Johns Hopkins, Minnesota, Yale) reported curtailment of research or teaching in one or another

[1] See table 25, ch. IV.

of the following subjects: medical care, industrial hygiene, physiological hygiene, health education, public health engineering, environmental sanitation, public health nursing, or biostatistics. At one school (Yale) the director reported that a reduction in enrollment might be necessary unless the school receives additional financial support. In some instances, one reason for curtailment was difficulty in getting properly qualified personnel, but the principal cause was lack of funds.

Requirements for Personnel

In addition to the actual curtailment of established teaching or research activities, lack of staff resources retarded development in many important areas at each of the schools. Staff needs reported by the schools affected almost all areas of instruction.

The 9 schools of public health included in this study reported the need for 131 additional full-time professional persons in 1950–51 [2] (table 34). The estimated number of additional full-time faculty

Table 34. Full-time professional staff required and available at each of 9 schools of public health

School	Estimated number of full-time faculty required	Number of full-time faculty available [1]	Estimated number of additional full time faculty needed [2]	Percent increase needed
Nine schools	363	232	131	56.5
California	32	28	4	14.3
Columbia	29	19	10	52.6
Harvard	72	50	22	44.0
Johns Hopkins	63	37	26	70.3
Michigan	39	26	13	50.0
Minnesota	32	20	12	60.0
North Carolina	43	31	12	38.7
Tulane	35	14	21	150.0
Yale	18	7	11	157.1

[1] Status A, full-time employment in the school of public health; data for 1949–50.
[2] Estimates for 1950–51.

members needed varied from 4 at one school (California) to 26 at another (Johns Hopkins). For all schools combined, the 131 additional faculty members would constitute a 56-percent increase over the 1949–50 faculty. More than two-thirds of these additional positions were needed at the five private schools. The average number of additional faculty members needed per school was 10 for the public schools and 18 for the private schools.

[2] The data on personnel needs of the schools were obtained in interviews during the 1950–51 academic year.

For some schools, and for some departments in all schools, considerable use was made of faculties from other divisions of the university (Status B) or of part-time faculty (Status C).[3] The requirements as summarized here therefore fail to show the entire faculty needs of the schools. In general, the deans indicated that all the important areas of teaching and research should be represented on the full-time faculty in order to preserve the unity and vigor of the schools' programs.

In addition to the 131 full-time faculty members needed, 4 schools (California, Columbia, Michigan, Minnesota) reported the need for a total of 11 part-time faculty members and 7 schools (California, Harvard, Michigan, Minnesota, North Carolina, Tulane, Yale) reported the combined need for approximately 50 additional nonprofessional staff members.

Table 35. Departmental requirements for full-time professional staff at 9 schools of public health

Department	Estimated number of full-time faculty required	Number of full-time faculty available [1]	Estimated number of additional full-time faculty needed [2]	Percent increase needed
All departments	303	232	131	56.5
Public health administration	34	18	16	88.9
Biostatistics	29	25	4	16.0
Public health education	15	10	5	50.0
Environmental sanitation	25	19	6	31.6
Epidemiology	29	21	8	38.1
Hospital administration	7	5	2	40.0
Industrial hygiene	23	15	8	53.3
Maternal and child health	30	15	15	100.0
Medical economics	12	6	6	100.0
Microbiology	19	14	5	35.7
Public health nursing	17	9	8	88.9
Nutrition and biochemistry	22	18	4	22.2
Physiological hygiene	14	10	4	40.0
Tropical public health	30	26	4	15.4
Other departments	57	21	36	171.4

[1] Status A, full-time employment in the school of public health; data for 1949–50.
[2] Estimates for 1950–51.

The combined requirements for additional full-time faculty members for individual departments [4] of the schools ranged from 2 in hospital administration to 16 in public health administration. For two departments (maternal and child health, medical economics) a 100-percent increase was considered necessary and for two other departments (public health administration, public health nursing) nearly as great an increase was indicated (89 percent). At the other extreme, tropical public health and biostatistics needed only about 15-percent increases (table 35). The 36 additional faculty members

[3] See "Staff" section of ch. III of this report for definitions.
[4] See ch. II for a discussion of the departmental organization of the schools of public health.

needed for "other" areas to some extent represented new fields in the curriculums of schools of public health. The specific subjects for which these 36 full-time faculty members were needed are shown in the following list:

Subject	*Number needed*
Total	36
Home care—general	9
Field training	5
Mental hygiene	5
Gerontology	4
Chronic illness	3
Social studies	3
Human biology	2
Preventive medicine and personal health	2
Veterinary medicine	1
Administration	2

Another view of faculty needs and trends in public health instruction may be obtained by grouping departments into the basic public health sciences and applied fields as in chapter II. The combined departments classified as basic public health sciences (biostatistics, epidemiology, microbiology, nutrition or biochemistry, physiological hygiene, tropical public health) had a total full-time faculty of 114 members during the academic year 1949–50. In 1951 the deans' estimates indicated that an additional 29 full-time faculty members would be required, representing a 25-percent increase. Among the departments concerned with the application of public health sciences to the organization of health services (public health administration, public health education, environmental sanitation, hospital administration, industrial hygiene, maternal and child health, medical economics, public health nursing), it was estimated that 66 full-time faculty members were required in addition to the 97 employed by the schools in 1949–50, an increase of nearly 70 percent. Many of the fields concerned with the application of public health sciences are more recent additions to the public health curriculum than are some of the basic public health sciences. Judging by the estimated number of additional faculty members needed in the schools of public health, the next few years will, in all likelihood, witness a more rapid expansion in the applied fields than in the basic public health sciences.

Were needed additional full-time faculty to be added to the full-time faculty of various departments as they were distributed in 1949–50, the ranking of departments in terms of their numbers of full-time faculty members would be substantially changed. Four departments in the applied fields would move up in rank, three would move down, and one would retain its 1949–50 rank. Public health admin-

istration would move from fifth place to first, maternal and child health would move from sixth place to second. On the other hand, among the basic public health sciences 4 departments would be reduced in rank and 2 would retain their same positions. The ranks of the departments according to 1949–50 staffing and the staffing pattern if needed faculty were added are shown in the tabulation below:

Department	Rank according to number of full-time faculty	
	1949–50	With additional faculty members
Applied fields:		
Public health administration	5	1
Public health education	8	9
Environmental sanitation	4	4
Hospital administration	11	12
Industrial hygiene	6	5
Maternal and child health	6	2
Medical economics	10	11
Public health nursing	9	8
Basic public health sciences:		
Biostatistics	2	3
Epidemiology	3	3
Microbiology	7	7
Nutrition	5	6
Physiology	8	10
Tropical public health	1	2

In the following paragraphs are summarized some of the plans described by deans in support of their estimates of needs for additional faculty and financial support.

Applied Fields of Public Health

The greatest numerical expansion in faculty is planned for public health administration, for which the deans of 7 schools estimated that 16 additional full-time staff members would be required. Two of these schools (North Carolina, Tulane) were planning to develop a program of instruction for nonmedical administrators. At two other schools (Columbia, Yale) consideration was being given to the closer coordination of instruction in public health, hospital, and medical care administration. It was felt that in this way the instruction in each of the three fields could be strengthened and a broader perspective achieved.

Four schools (Michigan, North Carolina, Tulane, Yale) estimated a combined need for six additional full-time faculty members for environmental sanitation. In addition to indicating the need for an expanded curriculum for students with special interests in this subject, the deans pointed out that additional staff was needed to bring

about more effective coordination between schools of public health and schools of engineering.

Five schools (Harvard, Johns Hopkins, Minnesota, Tulane, Yale) estimated a combined need for 15 additional full-time faculty members for maternal and child hygiene. This number would double the full-time faculty concerned with this subject in 1949–50. In addition to the general need to strengthen teaching and research in maternal and child health, several contemplated programs were reported. At one school (Johns Hopkins) a home-care program for children was planned—funds for which were already available. Another school (Tulane) had proposed a combined project with departments of public health, obstetrics, and pediatrics to provide for public health training of clinicians and adequate clinical instruction of candidates for a degree in public health. Another school (Yale) indicated the need for more effective coordination with the departments of pediatrics and obstetsics in the medical school.

Expansion of industrial hygiene departments was planned at five schools (Columbia, Harvard, Michigan, Minnesota, Yale). A trend towards the incorporation of instruction in the organization of health services for industrial workers was evident in industrial hygiene teaching. At one school (Michigan) an institute of industrial hygiene will be organized with the support of the General Motors Corp., to be supervised jointly by the medical school and the school of public health.

At four schools (Columbia, Michigan, Minnesota, Yale), the deans expressed an urgent need for expanding instruction in mental health. None of these schools had a full-time faculty member for teaching in this field during the study year.

Four schools (Columbia, Johns Hopkins, Michigan, Minnesota) planned to expand their faculty resources in medical care and public health economics. In at least two of these schools (Columbia, Minnesota) teaching was conducted by part-time personnel, and was considered to be inadequate to meet current needs.

Plans for expanding public health nursing programs were described at 5 schools (California, Johns Hopkins, Minnesota, North Carolina, Tulane) and additions to the teaching staff in health education were considered necessary at 4 (Columbia, Michigan, North Carolina, Tulane). The smallest numerical increase in faculty for existing departments was planned in hospital administration.

New areas of instruction in applied fields appeared to be emerging. One school (Johns Hopkins) reported plans to initiate a research program to evaluate methods of screening for chronic illness. Another school (Minnesota) was planning the organization of instruction in veterinary public health, since the university has a school of

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specialized areas in the future. There is little indication of a general trend toward a uniform pattern of education. Two schools which already had strong departments of industrial hygiene planned to expand their faculties in this branch; another school with a strong program of health education planned to add to the faculty in this field. These differences have undoubtedly contributed to the strength of the Nation's pattern of professional education in public health. Nevertheless, in many instances, important areas of teaching which have received only limited emphasis at some schools would be strengthened if additional funds permitted the addition of full-time faculty.

Additional Financial Support Required

Operating Funds

Enrollment Level of 1949–50

As reported by the deans, the 9 schools of public health needed a combined total of $1.8 million in 1949–50—in addition to the amount they spent for current operations—if they were to meet desirable standards of teaching and research. By far the largest part of this total ($1.2 million) represented salaries for additional professional and nonprofessional persons needed by the schools (appendix B, table 12).

To provide the additional faculty required to maintain proper standards of education for the 1949–50 enrollment, an increase of slightly more than $1 million would be required by the 9 schools of public health; an additional $144,000 was needed for nonprofessional staff. This estimate does not take into account any increase in salary levels to compensate for the increases in the cost of living since the survey was made. The estimated funds needed for additional professional staff differed considerably among schools, but did not vary directly with the number of full-time faculty members needed (table 34) since faculty members of all ranks, with widely varying salary levels, were included in the estimate. The school which needed the largest amount of money for additional faculty (Harvard) accounted for nearly one-fourth of the $1 million total, and another school (Michigan) for nearly as much. The school with the lowest estimate for additional faculty salaries (California) needed only 5 percent of the total.

Significant expansion in field-training facilities was considered necessary at five schools (Columbia, Harvard, Michigan, Minnesota, North Carolina). Although the specific field-training requirements differed among the schools, certain basic characteristics were common to the needs of all schools. Some deans felt that field training should

be organized around an operating health unit with sufficient varieties of special services to provide well-rounded experience for students. Staff personnel with time and ability to teach or supervise students would be required for this fieldwork, and it would be necessary for the school faculty to keep in touch with the students' training.

Some schools would provide for these needs by developing, in cooperation with local and State authorities, a field unit convenient to the school. Other schools considered that a large number of affiliated health agencies scattered over a wide geographic area would provide an opportunity for a greater range of practical experience than could be furnished by a single field unit. Some schools were planning a combination of these two types of training facilities. The kind of facility needed depended to some degree on the school's objectives in regard to field training and on the type of student for whom the facility was to be provided. For example, some schools were already providing field training not only for students who were candidates for degrees, but also for personnel of health departments and other agencies. The 5 schools that estimated the cost of expanding field-training facilities reported the need for slightly more than $364,000.

In addition to the $1.2 million required for salaries and the $364,000 for field-training facilities, at least another $253,000 was needed for other operating costs. This figure is perhaps a low estimate because it includes estimates for only four schools that reported on this item; probably all schools would have to meet increased operating costs if their faculties and programs were expanded.

Five of the nine schools reported that small amounts of additional money were available for operating expenses, but the total was only some $163,000. Deducting this amount from the total annual operating funds estimated as needed leaves an unmet balance of $1.7 million a year. The sums needed are summarized below:

Basic operating expense, 1949–50	$2, 955, 907
Additional annual operating funds needed	1, 842, 604
Salaries	1, 225, 714
Professional	1, 081, 908
Nonprofessional	143, 866
Field training	364, 400
Other operating needs	252, 550

Increased Enrollment

All 9 of the schools of public health considered that it would be feasible to increase their enrollment of graduate students, although 7 of the schools would need additional operating funds before such

an increase could be contemplated (table 36). The plans reported by the deans allowed for an increase of 600 graduate students, or 88 percent more such students than in 1949–50. Four schools (California, Harvard, North Carolina, Tulane) were planning expansion that would more than double their present graduate enrollments.

Table 36. Plans for increase in graduate enrollment at each of 9 schools of public health

School	Number of graduate students enrolled 1949–50 (estimated)	Additional number of graduate students planned	Percent increase	Increased operating funds needed
Nine schools	678	600	88.5	$1,280,940
California	73	77	105.5	203,000
Columbia	110	40	36.4	160,287
Harvard	01	89	145.9	306,000
Johns Hopkins	113	28	24.8	(1)
Michigan	82	80	97.6	320,000
Minnesota	101	74	73.3	(1)
North Carolina	77	126	162.3	08,000
Tulane	13	55	423.1	115,000
Yale	48	32	66.7	81,653

[1] No additional operating funds required for increased enrollment if 1949–50 requirements were met.

For all schools combined, the planned increases in enrollment would necessitate an additional $1.3 million in operating funds over and above the $1.8 million required for the 1949–50 enrollment level. Two schools (Johns Hopkins, Minnesota) reported they could increase their graduate enrollment by 25 and 73 percent, respectively, with no more increase in operating funds than that required for the 1949–50 enrollment.

Construction and Equipment

In 1949–50, only one school (Michigan) was not overcrowded.[8] The other 8 schools needed a total of $11.5 million for new or additional space and equipment (appendix B, table 13). The 9 schools needed an aggregate total of 526,000 square feet for their current enrollment. The estimated needs of individual schools varied widely, with little apparent relationship to the number of their students. The total space requirements (including renovation or replacement of existing facilities and any additions planned) ranged from 16,000 square feet at 1 school (Tulane) to 135,000 square feet at another (Columbia). These estimates include space currently available to the schools.

In order to carry out their plans for increased graduate enrollment, 3 schools (Harvard, Michigan, Tulane) would need a total of

[8] See ch. III for discussion of present facilities and needs.

120,000 square feet of additional space at an estimated cost of $4.4 million. If these figures are added to the estimated cost of space required for the 1949–50 graduate enrollment, the total construction needs of the 9 schools, for a graduate enrollment of 1,278, would be $15.9 million, including the $11.5 million to meet current needs. Of this amount, only $1.7 million was definitely available. Accordingly, the schools had an unmet need of $14.2 million for construction. If this amount were available, the schools could nearly double the graduate enrollment of 1949–50 (appendix B, table 13).

Independent of the estimates of the potentialities of schools of public health for increasing their enrollments, careful consideration must be given to the need and demand for education in this field. The problem of recruiting professional personnel into public health—particularly physicians—is a major one.

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APPENDIX A Accreditation

Revised Criteria for Accreditation of Public Health Courses [1]

The Criteria for accreditation of institutions for the degree Master of Public Health (M. P. H.—D. P. H. in Canada) and the degree Doctor of Public Health (Dr. P. H.) for the academic year 1949–50, as recommended by the Committee on Professional Education and approved by the Executive Board, are printed below. In comparing the new Criteria with the Criteria on which the accreditation of schools for the academic year 1948–49 was based, two changes will be noticed. The new Criterion No. 3 raises the old standard of a minimum requirement of 0 full-time senior faculty members to a new standard of 8, of which 4 must be primarily responsible to the administration of the school (previously 3). This new requirement is already met by all 10 schools which are accredited for 1948–49.

The new Criterion No. 12 for the Dr. P. H. degree will make it possible for the schools to accept for the Dr. P. H. degree unusually well qualified persons without a prior doctoral degree, while the old Criteria stipulated that such students must hold a prior doctoral degree.

Criteria for Institutions To Be Accredited for the Degree of Master of Public Health (Diploma of Public Health in Canada) and for the Degree of Doctor of Public Health, for the Academic Year 1949–50 [2]

CRITERIA FOR BOTH DEGREES

The Institution

1. Any institution to be accredited must be a member of the Association of American Universities, or present evidence that it may reasonably be considered as qualified for such membership.

2. The school, faculty, or council administering courses in public health must have such practical autonomy that requirements for the degrees are effectively controlled by the public health faculty.

3. The teaching of public health must be under the direction of a full-time teaching faculty which must include, in addition to assistant professors and others of lower rank and in addition to part-time appointees:

   a. One member of professorial grade as director of the school or department, and at least 3 other members of professorial or associate professorial grade—all 4 primarily responsible to the administration of the school, and

   b. At least four other members of professorial or associate professorial grade, either primarily responsible to the school or giving full time to the university and carrying specific major responsibility for teaching and research in the school. Such a minimum faculty could provide for a body of graduate students in public health totaling not more than approximately 30 such students.

[1] From American Journal of Public Health 39: 230–232, February 1949.

[2] Revision adopted by the Committee on Professional Education of the American Public Health Association, November 8, 1948. Approved by the Executive Board November 29, 1948.

4. The school or department must have an assured minimum basic income adequate for its teaching and research functions and for meeting the various criteria outlined. Such income should be construed to include income from endowment of the school, contributions made from general university funds, and grants made over a period of at least 5 years from sources outside the university.

5. Proper housing must be available, including lecture rooms, seminar rooms, and adequate laboratory facilities for the teaching of subjects in the field of microbiology, including microscopes, culture media, apparatus, etc.; for the teaching of vital statistics, including calculating machines for student use, and apparatus for chart-making, with tabulating machinery accessible for demonstration purposes; and for the teaching of sanitary engineering, including laboratory facilities for the examination of water and sewage and for the demonstration of the basic principles of hydraulics.

6. Library facilities are essential to the extent of at least 3,000 volumes in the general field of public health, including such special topics as epidemiology, microbiology, vital statistics, sanitary engineering, medical economics and medical sociology, nutrition, and the like, and current periodicals (not including health department reports) to the number of at least 50 in the fields mentioned above.

7. There must be available conveniently located administrative units of public health services which can be utilized for observation and criticism in the basic courses for the Master of Public Health, and which are of sufficiently high quality to make such observation fruitful.

CRITERIA FOR THE M. P. H. DEGREE

The Course

8. Candidates to be admitted for the degree of Master of Public Health (Diploma of Public Health in Canada) may be either:

a. Holders of the degree of M. D., D. D. S., or D. V. M., or equivalent degree, from an acceptable institution; or

b. Holders of the Bachelor's Degree with adequate training in mathematics and the natural sciences, including chemistry and biology, and also qualified in some professional capacity to pursue education in public health.

The latter qualifications may normally be fulfilled either by—

x. Professional academic qualifications in engineering, public health nursing, education, or some other field of public health representing the equivalent of at least one year of academic work in addition to the completion of a four years course leading to the Bachelor's Degree;

y. or experience (normally not less than 3 years) in some field of public health practice or in teaching of a type acceptable to the school.

9. The length of the course shall be not less than one academic year of 32 weeks.

It is highly desirable that the candidate shall have had practical public health experience in the form of supervised field service or in a position involving the exercise of substantial initiative and responsibility. This experience should preferably be obtained prior to entrance into the school. In some schools, candidates not so equipped on entrance are required to complete three months of practical work in the field before receiving their degree.

10. The following courses are among those generally offered in schools of public health:

a. Public Health Practice (Administration)
b. Sanitation
c. Microbiology
d. Vital Statistics
e. Epidemiology
f. Physiological Hygiene
g. Nutrition
h. Public Health Nursing
i. Health Education
j. Social and Economic Factors Influencing Health (Economic Factors in Health)
k. Mental Hygiene
l. Public Health Law
m. Industrial Hygiene
n. School Health
o. Maternal and Child Health
p. Tuberculosis
q. Venereal Disease
r. Dental Health
s. Hospital Administration

It is believed that it would be highly undesirable to make standard requirements with regard to any particular courses of instruction. It does seem important, however, that the student—at some point in the M. P. H. course, or prior to that course—shall receive instruction in the following basic fields:

A. Basic Public Health Sciences

(1) The nature and functioning of the human organism, and the personal behavior which influences its well-being, including nutrition and mental hygiene.

(2) The nature and behavior of various forms of parasitic life, including viruses; their interaction with the human body as demonstrated by clinical and immunological reactions; the modes in which such microorganisms are transferred from host to host in the course of their epidemiological history; and the ways in which such dissemination may be controlled.

(3) The physical environment as it influences health, including not only the classical problems of environmental sanitation, but also those relating to housing and industrial hygiene.

(4) The social and economic factors which influence the health of the individual and of the community, and the influences of sickness on the social and economic status of the individual and the community.

(5) The nature and sources of quantitative information bearing on the health of the people, and its numerical presentation and analysis.

11. There must be opportunity for advanced specialization in one or more of the fields listed under 10 above or in such special fields as tuberculosis control, venereal disease control, or tropical medicine. There will be little time available in the M. P. H. year for advanced specialization; but basic work can be conducted effectively only in an atmosphere of advanced scholarship and with the essential stimulus which comes from the conduct of productive research by the faculty and advanced students.

CRITERIA FOR THE DR. P. H. DEGREE

12. Candidates to be matriculated for the degree of Dr. P. H. must be persons of demonstrated ability and promise of leadership. They must normally hold a doctoral degree from an acceptable university; although in exceptional cases, candidates of unusual experience and attainment may be admitted without such a degree.

13. The candidate for the Dr. P. H. must complete—or must already have completed—basic courses equivalent to those required for the degree of M. P. H. by the university in which such student matriculates for the Dr. P. H.

14. The candidate, in addition to fulfilling criteria 12 and 13 must complete a minimum of one academic year of work in residence at the university involving advanced specialization in the particular area of public health for which the student is preparing. The total period of academic instruction in public health should be at least two years beyond that spent in acquiring previous doctoral degrees.

15. The candidate must demonstrate ability for leadership in his field, as well as for advancement of scientific knowledge. This must be indicated by successful professional experience in a post involving the exercise of substantial initiative and responsibility, preferably prior to admission.

16. The candidate must indicate capacity to make substantial contributions to the advancement of the science and art of public health by submitting a dissertation, *based on original research*, satisfactory to the authorities of the university.

A New Step in the Accreditation Program [3]

The Executive Board on January 28, 1940, approved the recommendations of the Committee on Professional Education to accredit institutions for Master's degrees other than the M. P. H. (M. A., M. S., M. S. P. H., M. Ed., etc.) with specialization in the field of public health education. This accreditation will be limited to institutions with schools of public health already accredited for the M. P. H. degree. The schools of public health will be in a position) utilize the teaching facilities of closely collaborating university departments id to grant admission to students interested in a career in health education o do not meet the admission requirements for the M. P. H. course but otherwise qualified. Below are printed the Criteria for the accreditation ter's degrees in public health education other than the M. P. H.

believed that this step will enable most of the schools of public health ease materially the number of those students who wish to prepare lves for a career in public health education. It is hoped that this one step in the direction of relieving the shortage of trained community educators.

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n American Journal of Public Health 30: 535, April 1940.

Criteria for Institutions To Be Accredited for Master's Degrees other than the M. P. H. (M. A., M. S., M. S. P. H., M. Ed., etc.), with Specialization in the Field of Public Health Education, for the Academic Year 1949–50 [4]

1. Candidates admitted for the degree must hold a Bachelor's degree and must have completed at the collegiate level or must include as part of their graduate year, basic academic training in the fields of chemistry, biology, bacteriology, physiology, sociology, psychology, and education.

2. The course for the Master's degree must occupy at least one academic year of which at least half time must be devoted to study in the subject matter areas listed in paragraph 4*a*, *b*, and *c* below.

3. The curriculum must be given in a school of public health accredited by the American Public Health Association or in such collaboration with such a school that the requirements of paragraph 4*a*, *b*, and *c* below are satisfied through utilization of courses in said school or acceptable for credit in said school.

4. The following areas of knowledge should be covered in the graduate course unless credits for previous work acceptable to the institution are presented:

a. Physiological and psychological hygiene (including nutrition and mental hygiene).

b. Microbiology, epidemiology, and sanitation.

c. Community health and community organization (including both official and voluntary agencies).

d. Health education (including both public health education and school health education).

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[4] Adopted by the Committee on Professional Education of the American Public Health Association, December 8, 1948; approved by the Executive Board, January 28, 1949.

APPENDIX B Tables

Appendix B, table 1. Number of professional and technical staff by academic title and status at each of 9 schools of public health—1949–50 [1]

School	Total professional and technical staff	Professional staff																Technical staff		
		All professional staff				Professors, associate professors			Lecturers			Assistant professors, associates, instructors, research associates			Assistants, research assistants, research fellows					
		Total	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	Total	A	B+C
Nine schools	586	484	232	106	146	102	41	16	12	17	66	95	36	51	23	12	13	102	92	10
California	75	75	28	15	32	8	5	----	6	3	24	13	7	6	1	----	2	----	----	----
Columbia	52	47	19	3	25	8	----	3	1	3	18	7	----	3	3	----	1	5	5	----
Harvard	128	94	50	13	31	17	3	2	1	1	3	20	1	19	12	5	7	34	33	1
Johns Hopkins	108	75	37	23	15	18	5	4	----	5	7	18	11	4	1	2	----	33	28	5
Michigan	69	59	26	18	15	13	6	1	4	5	10	8	7	4	1	----	----	10	10	----
Minnesota	39	31	20	8	3	11	4	2	----	----	----	6	4	1	3	----	----	8	4	4
North Carolina	47	39	31	6	2	15	2	----	----	----	----	15	2	----	1	2	2	8	8	----
Tulane	44	40	14	10	16	9	9	2	----	----	4	4	1	9	1	----	1	4	4	----
Yale	24	24	7	10	7	3	7	2	----	----	----	4	3	5	----	----	----	----	----	----

[1] Data from individnal staff schedules received.

NOTE.—Status A, full-time employment in the school of public health; Status B, full-time employment in the university, giving part time to school of public health; Status C, part-time employment in the school of public health with main employment outside the university.

Appendix B, table 2. Number of professional staff by academic degree, employment status, and professional degree at 9 schools of public health—1949–50 [1]

Status and professional degree	Academic degree							
	Total	DrPH	MPH	PhD ScD	Other masters	Bachelors	Other	None or unknown
All professional staff	484	32	85	111	108	114	2	34
Status A.—All full time in school	232	18	35	74	48	45		12
Physicians	78	13	23	7	5	23		7
Dentists								
Veterinarians	1	1						
Nurses	15		4		9	2		
Engineers	18	1	1	5	7	2		2
Not identifiable by professional degree	120	3	7	62	27	18		3
Status B.—All full time in university, part time in school	106	5	10	23	29	27	1	11
Physicians	41	5	5	4	6	16		5
Dentists	1				1			
Veterinarians	1		1					
Nurses	5		1		3			1
Engineers	11			3	4		1	3
Not identifiable by professional degree	47		3	16	15	11		2
Status C.—All other part time	146	9	40	14	29	42	1	11
Physicians	89	8	34	4	6	32		5
Dentists	3		1					2
Veterinarians								
Nurses	9		1		4	2		2
Engineers	9	1	1		4	1		2
Not identifiable by professional degree	36		3	10	15	7	1	

[1] Data from individual staff schedules received.

Appendix B, table 3. Comparison of age distributions of dental school and public health school faculties in each employment status—1949–50

Employment status	Average age	Percentage distribution					
		All ages	Under 30	30–39	40–49	50–59	60+
	Dental schools [1]						
Total	40	100	20	32	25	16	7
Status A	41	100	21	26	23	21	9
Status B	40	100	18	33	26	15	8
Status C	40	100	20	34	26	14	6
	Schools of public health						
Total	42	100	10	34	35	16	5
Status A	41	100	13	38	32	13	4
Status B	42	100	11	32	31	21	5
Status C	44	100	6	30	40	16	8

[1] Federal Security Agency, Public Health Service. Financial Status and Needs of Dental Schools, PHS Pub. No. 200. Washington: U. S. Government Printing Office, 1952. 83 pp. Definitions of the 3 employment status groups were equivalent to those used in this study.

able 4. Sex and marital status of students enrolled at each of 9 schools of public health—1949–50 [1]

Scho	Both sexes				Male				Female			
	Total	Married	Not married [2]	Unknown	Total	Married	Not married [2]	Unknown	Total	Married	Not married [2]	Unknown
	All students											
Nine schools	1,097	474	615	8	631	420	206	5	466	54	409	3
California	232	98	134		170	92	78		62	6	56	
Columbia	123	74	46	3	103	66	35	2	20	8	11	1
Harvard	86	47	37	2	58	44	13	1	28	3	24	1
Johns Hopkins	123	77	45	1	96	74	21	1	27	3	24	
Michigan	151	52	99		52	40	12		99	12	87	
Minnesota	216	55	161		58	43	15		158	12	146	
North Carolina	111	43	67	1	57	36	21		54	7	46	1
Tulane	13	7	6		12	7	5		1		1	
Yale	42	21	20	1	25	18	6	1	17	3	14	
	Graduate students											
Nine schools	631	363	261	7	466	335	126	5	165	28	135	2
California	73	48	25		55	44	11		18	4	14	
Columbia	105	63	39	3	89	57	30	2	16	6	9	1
Harvard	60	36	22	2	43	34	8	1	17	2	14	1
Johns Hopkins	104	67	36	1	88	66	21	1	16	1	15	
Michigan	78	42	36		45	35	10		33	7	26	
Minnesota	83	42	41		54	39	15		29	3	26	
North Carolina	77	38	39		57	36	21		20	2	18	
Tulane	13	7	6		12	7	5		1		1	
Yale	38	20	17	1	23	17	5	1	15	3	12	

	Undergraduate students											
Four schools	336	44	292		94	29	65		242	15	227	
California	137	30	107		94	29	65		43	1	42	
Michigan	59	5	54						59	5	54	
Minnesota	129	9	120						129	9	120	
North Carolina	11		11						11		11	
	Special students											
Eight schools	130	67	62	1	71	56	15		59	11	47	1
California	22	20	2		21	19	2		1	1		
Columbia	18	11	7		14	9	5		4	2	2	
Harvard	26	11	15		15	10	5		11	1	10	
Johns Hopkins	19	10	9		8	8			11	2	9	
Michigan	14	5	9		7	5	2		7		7	
Minnesota	4	4			4	4						
North Carolina	23	5	17	1					23	5	17	1
Yale	4	1	3		2	1	1		2		2	

[1] Data from individual student schedules received.

[2] Includes widowed, separated, divorced, or never married.

Appendix B, Table 3. Residence of students enrolled at each of 9 schools of public health—1949–50 [1]

School	All countries	Foreign countries	United States		
			Total	Same State	Other State
All students					
Nine schools	1,097	146	951	468	483
California	232	7	225	189	36
Columbia	123	20	103	41	62
Harvard	86	26	60	25	35
Johns Hopkins	123	34	89	21	68
Michigan	151	22	129	44	85
Minnesota	216	13	203	94	109
North Carolina	111	9	102	42	60
Tulane	13	8	5		5
Yale	42	7	35	12	23
Graduate students					
Nine schools	631	110	521	198	323
California	73	4	69	46	23
Columbia	105	14	91	34	57
Harvard	60	16	44	16	28
Johns Hopkins	104	31	73	15	58
Michigan	78	12	66	16	50
Minnesota	83	18	70	29	41
North Carolina	77	8	69	31	38
Tulane	13	8	5		5
Yale	38	4	34	11	23
Undergraduate students					
Four schools	336	8	333	220	113
California	137	1	136	128	8
Michigan	59	1	58	24	34
Minnesota	129		129	65	64
North Carolina	11	1	10	3	7
Special students					
Eight schools	130	33	97	50	47
California	22	2	20	15	5
Columbia	18	0	12	7	5
Harvard	20	10	10	0	7
Johns Hopkins	19	3	10	0	10
Michigan	14	0	5	4	1
Minnesota	4		4		4
North Carolina	23		23	8	15
Yale	4	3	1	1	

[1] Data from individual student schedules received.

Appendix B, table 6. State of residence for United States students enrolled at schools of public health—1949–50 [1]

State	All schools	California	Columbia	Harvard	Johns Hopkins	Michigan	Minnesota	North Carolina	Tulane	Yale
All States [2]	951	225	103	60	89	129	203	102	5	35
Alabama	7	----	1	1	2	----	1	1	1	----
Arizona	3	1	----	----	----	2	----	----	----	----
Arkansas	3	1	----	1	----	----	1	----	----	----
California	202	189	1	3	4	3	2	----	----	----
Colorado	7	1	----	----	1	3	1	1	----	----
Connecticut	21	----	2	----	1	5	1	----	----	12
Delaware	3	1	----	----	1	----	----	----	----	1
District of Columbia	4	----	----	1	1	1	----	----	----	1
Florida	12	----	2	1	3	1	1	4	----	----
Georgia	14	----	3	2	2	1	2	4	----	----
Idaho	3	----	1	----	----	----	1	1	----	----
Illinois	34	1	----	1	1	11	10	4	----	----
Indiana	12	----	1	----	2	3	3	1	----	2
Iowa	16	----	1	1	----	2	12	----	----	----
Kansas	12	2	----	2	2	1	5	----	----	----
Kentucky	1	----	----	----	----	1	----	----	----	----
Louisiana	9	1	3	1	1	1	----	2	----	----
Maine	2	----	----	----	1	----	1	----	----	----
Maryland	25	1	----	----	21	1	----	2	----	----
Massachusetts	40	----	1	26	1	3	1	1	----	5
Michigan	53	----	4	----	1	44	4	----	----	----
Minnesota	101	----	----	1	2	2	94	2	----	----
Mississippi	4	2	1	----	----	----	----	1	----	----
Missouri	14	1	----	1	1	5	4	2	----	----
Montana	3	----	----	----	1	----	1	----	1	----
Nebraska	4	----	----	----	1	----	3	----	----	----
Nevada	1	1	----	----	----	----	----	----	----	----
New Hampshire	4	1	----	1	2	----	----	----	----	----
New Jersey	10	----	9	1	4	1	----	1	----	----
New Mexico	2	1	1	----	----	----	----	----	----	----
New York	90	1	41	7	11	14	5	6	----	5
North Carolina	46	----	2	----	1	1	----	42	----	----
North Dakota	5	----	----	----	----	----	5	----	----	----
Ohio	18	1	3	----	1	7	4	1	----	1
Oklahoma	8	----	1	1	2	2	2	----	----	----
Oregon	8	4	----	----	1	----	3	----	----	----
Pennsylvania	19	2	6	2	3	----	4	2	----	----
Rhode Island	4	----	2	----	----	1	----	----	----	1
South Carolina	10	----	----	1	1	----	----	8	----	----
South Dakota	5	----	----	----	----	----	5	----	----	----
Tennessee	9	----	2	1	----	1	----	3	2	----
Texas	8	1	1	1	1	2	2	----	----	----
Utah	2	----	1	----	1	----	----	----	----	----
Virginia	7	----	2	----	1	----	1	3	----	----
Washington	4	----	----	----	1	----	2	----	----	1
West Virginia	5	----	2	----	1	----	----	2	----	----
Wisconsin	17	----	1	1	1	3	10	1	----	----
Wyoming	2	1	----	----	----	1	----	----	----	----
Hawaii	3	----	1	----	1	1	----	----	----	----
Puerto Rico	11	----	4	1	2	1	----	2	1	----
Virgin Islands	1	----	----	----	----	----	----	1	----	----
United States unspecified	37	11	3	2	4	4	6	4	----	3

[1] Data from individual student schedules received.
[2] No students reported residence in Vermont or Alaska.

Appendix 8, table 7. Number of students at 9 schools of public health reporting amounts of assistance payments—1949–50 [1]

Amount per month	Foreign				United States			
	All foreign	Graduate	Undergraduate	Special	All U. S.	Graduate	Undergraduate	Special
All amounts	122	93	2	27	551	399	107	45
Under $50					10	5	5	
$50–$99	2	2			103	47	52	4
$100–$149	14	10	1	3	233	96	121	16
$150–$199	63	55		8	69	35	15	10
$200–$249	30	18		12	48	40	4	4
$250–$299	0	5	1	3	10	15		1
$300–$349	1	1			16	11		5
$350–$399					20	16		4
$400–$449	1			1	7	7		
$450–$499					16	16		
$500–$549					11	10		1
$550–$599	1	1			8	8		
$600–$649					1	1		
$650–$699	1	1						
$700–$749					2	2		
Median	$180	$182	(2)	$210	$135	$160	$117	$162

[1] Data from individual student schedules received.
[2] Median not calculated because of small number of students.

Appendix B, table 8. State of residence for United States alumni of each of 8 schools of public health [1]

State	Total	California	Harvard	Johns Hopkins	Michigan	Minnesota	North Carolina	Tulane	Yale
All States	2,707	85	438	1,061	437	220	297	13	276
Alabama	31		9	15	1	2	2		2
Alaska	8	1	1		3			1	2
Arizona	8		1	2	3	1			1
Arkansas	22		8	5	1		4		4
California	231	55	43	59	22	20	11		21
Canal Zone	3			3					
Colorado	40		4	16	6	7	9		4
Connecticut	91		10	7	2	1	3		68
Delaware	6			3	2		1		
District of Columbia	148	1	17	71	14	9	8	1	27
Florida	46	2	7	21	1		12	1	2
Georgia	57		6	20	8	1	11		5
Hawaii	16		1	6	2	1			6
Idaho	13		1	1	8	2		1	
Illinois	85		14	17	24	9	10	1	10
Indiana	32		1	12	13	1	3	1	1
Iowa	25		6	6	1	11			1
Kansas	21		4	4	8	4			1
Kentucky	32		6	20	2	1	2		1
Louisiana	37		3	17	5	1	4	4	3
Maine	10		6	2	1				1
Maryland	141		13	112	5	3	4		4
Massachusetts	126		76	23	7		2		18
Michigan	112		8	36	62	7	3		2
Minnesota	81		7	6	2	63	1		2
Mississippi	44		5	18	2	1	14		4
Missouri	41		5	18	9	4	2	1	2
Montana	4			2					2
Nebraska	10		1		5	3	1		
Nevada	4		3		1				
New Hampshire	6		2	2	1				1
New Jersey	22		2	8	3	2	2		5
New Mexico	13	2	3	4	2		2		
New York	275	2	47	152	14	8	17		35
North Carolina	125		11	23	5	1	78		7
North Dakota	7			1	3	3			
Ohio	46		7	20	4	3	8		4
Oklahoma	33		7	14	6	2	3		1
Oregon	38	5	8	12	4	6			3
Pennsylvania	44	3	10	16	5	4	4		2
Puerto Rico	42		3	7	12	4	16		
Rhode Island	5		1	1		2			1
South Carolina	39		2	7	3		24		3
South Dakota	9			5	2	2			
Tennessee	76		10	48	8	1	6	2	6
Texas	63	1	16	32	13	1	4		2
Utah	7		3		3		1		
Vermont	6		3	1		1	1		
Virginia	56		10	33	2	2	7		2
Virgin Islands	4				3	1			
Washington	39		10	14	10	3	1		1
West Virginia	24			10	6		7		1
Wisconsin	38	1	3	5	18	7			4
Wyoming	2	2							
Military and foreign	55	5	16	23			7		4
Unknown	108	5	4	52	90	15	2		

[1] Data not available from Columbia. Alumni defined as recipients of masters' or doctors' degrees.

Appendix B, table 9. Instructional expense by department at each of 7 schools of public health—1949–50

Department or division	Seven schools [1]	California	Columbia	Harvard	Johns Hopkins	Michigan	Minnesota	Tulane
Instructional expense	$1,720,815	$300,790	$143,905	$325,704	$437,973	$277,079	$157,694	$77,700
Public health administration	406,435	21,242	10,238	58,260	162,299	120,868	15,576	8,946
Biostatistics	191,020	37,472	18,905	32,186	41,322	29,748	21,414	10,573
Public health education	44,505	25,981	12,037	----	----	----	5,887	----
Environmental sanitation	130,127	30,390	17,267	7,574	12,064	40,883	21,049	----
Epidemiology	107,515	32,924	22,634	30,140	33,803	37,346	----	10,062
Hospital administration	51,480	11,522	10,058	----	----	----	20,000	----
Industrial hygiene	70,059	20,224	17,802	26,873	----	----	----	----
Maternal and child health	111,610	37,395	----	74,215	----	----	----	----
Medical economics	32,203	5,100	----	----	----	27,103	----	----
Microbiology	142,750	70,883	----	22,385	49,482	----	----	----
Public health nursing	20,101	----	----	----	----	----	20,101	----
Nutrition	72,603	----	----	27,858	44,745	----	----	----
Physiological hygiene	106,729	----	----	18,073	43,573	----	44,183	----
Tropical public health	153,007	----	23,454	27,228	42,075	12,131	----	47,519
All other	19,171	1,627	950	----	8,010	----	8,584	----

[1] Departmental data not available for the North Carolina and Yale schools.

Appendix B, table 10. Expense for research budgeted separately by department at each of 7 schools of public health—1949–50

Department or division	Seven schools [1]	California	Columbia	Harvard	Johns Hopkins	Michigan	Minnesota	Tulane
Expense for research budgeted separately	$1,221,835	$42,070	$30,536	$453,001	$420,794	$146,027	$87,153	$31,754
Public health administration	120,754	5,218	----	90,057	26,453	1,426	----	----
Biostatistics	43,010	----	----	982	30,793	2,318	2,823	6,100
Public health education	935	----	935	----	----	----	----	----
Environmental sanitation	48,945	----	12,091	----	----	10,446	20,408	----
Epidemiology	311,414	7,070	5,341	9,501	155,889	125,957	7,056	----
Hospital administration	----	----	----	----	----	----	----	----
Industrial hygiene	102,028	1,500	14,201	80,237	----	----	----	----
Maternal and child health	24,843	----	----	24,843	----	----	----	----
Medical economics	23,962	23,182	----	----	----	780	----	----
Microbiology	101,588	4,500	----	50,564	100,524	----	----	----
Public health nursing	20,999	----	----	----	----	----	20,000	----
Nutrition	151,710	----	----	115,080	30,030	----	----	----
Physiological hygiene	81,020	----	----	42,572	11,681	----	26,867	----
Tropical public health	102,004	----	6,878	27,105	42,307	----	----	25,054
All other	7,017	----	----	----	7,017	----	----	----

[1] Departmental data not available for the North Carolina and Yale schools.

Appendix B, table 11. Source of tuition and fees at each of 9 schools of public health—1949–50

Type of control and school	All sources	Paid by students	Veterans' Administration	State and local agencies	Foundations	Public Health Service	Other Federal	Foreign governments	World Health Organization	All other
Nine schools	$425,052	$97,545	$141,360	$73,418	$32,101	$28,706	$18,951	$11,495	$11,383	$10,093
Public control	229,410	60,737	83,917	53,987	6,784	8,416	5,021	5,085	2,318	3,145
California	52,920	19,620	24,790	3,700	1,480	740	2,590			
Michigan	60,414	13,540	20,339	15,125	2,125	2,375	1,025	2,500	2,135	1,250
Minnesota	61,140	22,683	19,382	9,599	734	4,219	1,406	1,039	183	1,895
North Carolina	54,936	4,894	19,406	25,563	2,445	1,082		1,546		
Private control	195,642	36,808	57,443	19,431	25,317	20,290	13,930	6,410	9,065	6,948
Columbia	64,364	19,310	25,100	5,790	3,210	5,150	330	2,570	20	2,884
Harvard	45,155	4,473	8,810	6,976	9,262	2,850	5,700	1,140	1,995	3,949
ɔpkins	68,033	5,970	20,353	4,540	11,475	9,830	6,900	2,700	6,150	115
	6,625	3,000		2,125		500	1,000			
	11,465	4,055	3,180		1,370	1,960			900	

Appendix B, table 12. Estimated cost of additional personnel and of other operating needs and funds available at each of 9 schools of public health—1949–50

Item	Total	California	Columbia	Harvard	Johns Hopkins	Michigan	Minnesota	North Carolina	Tulane	Yale
Additional annual operating needs	$1,842,664	$69,200	$171,250	$363,498	$273,000	$350,400	$160,016	$249,500	$128,300	$77,500
Salaries [1]	1,225,714	69,200	87,500	288,498	129,200	241,000	110,016	94,500	128,300	77,500
Professional	1,081,908	57,200	87,500	246,392	129,200	211,000	85,516	82,000	116,100	67,000
Nonprofessional	143,806	12,000		42,106		30,000	24,500	12,500	12,200	10,500
Field training	364,400	[2]	40,000	50,000	[2]	69,400	50,000	155,000	[2]	[2]
Other operating needs	252,550		43,750	25,000	143,800	40,000				
Funds available	163,128	29,600		77,628	13,400		9,000			33,600
Balance (unmet needs)	1,679,536	39,600	171,250	285,870	259,600	350,400	151,016	249,500	128,300	44,000

[1] Salaries for full-time and part-time staff.
[2] No cost estimate given.

Appendix B, table 13. Estimated cost of needed construction and equipment and funds available at each of 9 schools of public health—1949–50

School	1949–50 graduate enrollment				Increase in graduate enrollment				Total planned increased enrollment				Funds available	Unmet needs
	Estimated number of students	Estimated cost of needed space			Number of students	Estimated cost of needed space			Number of students	Estimated cost of needed space				
		Total	Construction	Equipment		Total	Construction	Equipment		Total	Construction	Equipment		
Nine schools	678	$11,518,500	$10,728,800	$789,700	600	$4,413,200	$4,281,200	$132,000	1,278	$15,931,700	$15,010,000	$921,700	$1,675,000	$14,256,700
California	73	[1] 2,120,000	2,020,000	100,000	77				150	2,120,000	2,020,000	100,000	1,250,000	870,000
Columbia	110	[1] 4,000,000	4,000,000		40				150	4,000,000	4,000,000		[2]	4,000,000
Harvard	61	223,700	164,000	59,700	89	2,051,000	2,051,000		150	2,274,700	2,215,000	59,700		2,274,700
Johns Hopkins	113	287,000	250,000	37,000	28				141	287,000	250,000	37,000	75,000	212,000
Michigan	82				80	2,000,000	2,000,000		162	2,000,000	2,000,000			2,000,000
Minnesota	101	[1] 950,000	750,000	200,000	74				175	950,000	750,000	200,000	350,000	600,000
North Carolina	77	[1] 1,875,000	1,500,000	375,000	125				202	1,875,000	1,500,000	375,000		1,875,000
Tulane	13	62,800	44,800	18,000	55	362,200	230,200	132,000	68	425,000	275,000	150,000		425,000
Yale	48	[1] 2,000,000	2,000,000		32				80	2,000,000	2,000,000			2,000,000

[1] For new space replacing present facilities.
[2] Some funds available, amount not given.